Rock Products

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No Waste at This New Jersey Sand Operation

The Raritan River Sand Co., New Brunswick, N. J., Produces Nine Grades of Sand, Two Grades of Clay, and Two Sizes of Gravel—Has Four Plants That Ship by Rail, Highway and Water—Output 2000 Tons Per Day

CLAY, to operators in the sand and gravel, crushed stone, and other branches of the rock products industries, is an ancient enemy and has always been the most troublesome element in the production of clean materials. At stone quarries it appears usually as overburden and frequently in pockets and seams throughout the deposit; at sand and gravel deposits it usually comprises the overburden or appears in ball form throughout the deposit, and on many properties solid strata of it run through the heart of a deposit.

Hundreds of operations have been abandoned and many companies have gone out of business because of it. This has been for the reason that no method could be devised for economically extracting the desired material from the deposit without taking the clay and dirt with it. Of course, where the clay appears only in the overburden and in a small quantity in the form of balls, it is of little consequence. The overburden can be stripped and the small amount found in the deposit itself can be removed by washing as the material is being sized. But at a sand and gravel deposit where a stratum of clay of considerable thickness extends through its center, it is usually considered unwise to attempt to oper-

This view shows approximately two-thirds of the deposit from which five grades of sand and two kinds of clay are obtained

The shovel is operating on top of the lower stratum of clay. Note the different materials in the bank

This shovel is also working on the lower level (on top of the lower deposit of clay)

Excavating the lower clay deposit. This clay is used chiefly for stopping leaks in tunnel work

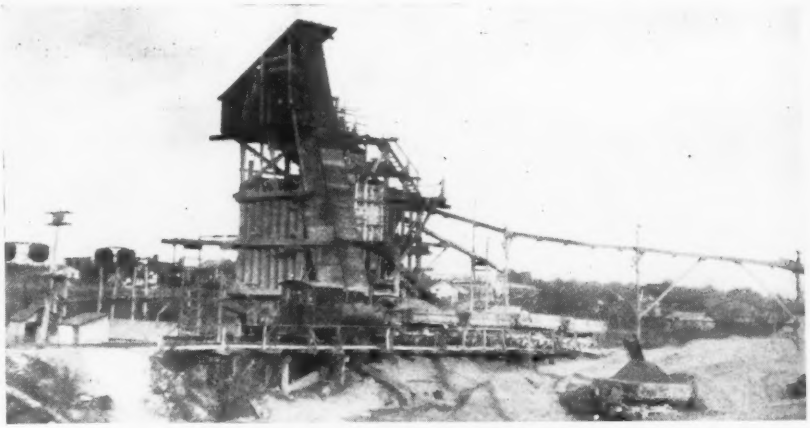
This deposit is entirely removed from the sand and clay pits and is composed of 25 per cent gravel and 75 per cent sand

ate it because of the comparatively enormous cost of separating the two materials.

Just such a deposit, owned by the Raritan River Sand Co., is located a few miles from New Brunswick, N. J., on the west side of the Raritan river. It is an exception to the usual rule that it is unwise to operate such a deposit and expect to do so profitably, because this company has a market for the clay, and it is considered a product rather than an overburden to be removed and wasted.

In all, the property comprises 450 acres, 300 of which are covered with marketable materials. The remaining 150 acres are used by the company for farming purposes. As a whole, the property is most unusual geologically for on it there are two entirely different deposits—one of gravel and sand and the other of sand (no gravel) with two strata of clay. The latter covers the greater area and from it are obtained five grades of sand and two kinds of clay. One of these grades is separated into five distinct sizes, all of which are sold for sandblast and foundry use. The other four grades are sold as building, asphalt, concrete and fire sands.

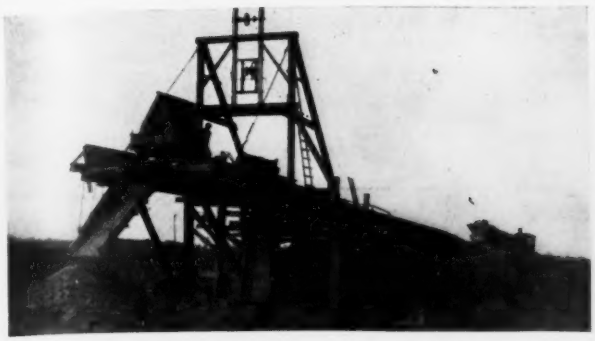
This deposit averages 40 ft. in depth and has been opened to a length of approximately 4000 ft. There is no overburden whatever, the top being a 12-ft. layer of sand suitable for concrete. Next is a 4-ft. layer of fine sand. This is sold for asphalt and traction purposes. Underlying this layer is a very coarse fire sand which is graded into five sizes and marketed as blast and



This plant takes care of the sand and gravel pits products only. The sand and clay pit has individual washing and screening units

Loading 4-yd. cars at the gravel deposit. Note the uniformity of the bank

Recovering sand from storage with a conveyor loader. The sand is sluiced to storage



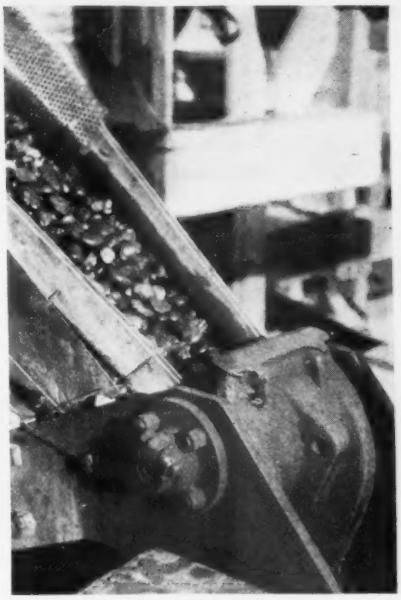
Loading a barge with clay at the dock; 4-yd. steel cars and locomotives are used

There are two truck-loading bins for gravel and three for sand. Material from any of the plants can be taken here

foundry sand. Next is a deposit of fireclay, varying from 5 to 15 ft. in depth. This is excavated by a small steam shovel equipped with a 1¼-yd. bucket. Under the clay are two additional layers of sand—one a medium grade similar to the layer on top which is used for concrete, and the other a fine sand.

The last or bottom material in this deposit is a stratum of plastic red-spotted blue clay. This is excavated by clamshell and loaded into cars. The first use to which it was put was the making of hollow tile, and a great percentage of it is still sold for that purpose. Recently, however, it has been put to use in tunnel work in New York City by Booth & Flynn, contractors, in stopping leaks. Practically the entire output is being shipped at present for use in the new vehicular tunnel under the Hudson river.

The other deposit is approximately a half mile from the one just described. It is 50 ft. in thickness, is opened to a length of slightly more than one-quarter mile, and averages 25 per cent gravel and 75 per cent sand which also is suitable for concrete. This bank is worked by a Thew revolving shovel equipped with 1¼-yd. bucket, loading 4-yd. two-way dump cars. These are hauled five to a train over 36-in. gage track by steam locomotive to a washing and screening plant individually serving the deposit.



The oversize keeps this little jaw crusher busy

This plant, while having no unusual features, is of solid timber construction and is designed for the thorough cleaning and grading of both materials. The cars are dumped into a track hopper from which the material is discharged into the boot of a 24-in. belt-bucket elevator. The elevator empties into a chute leading direct to a 60-in. conical screen of 1½-in. perforations.

Rejections from the screen move by gravity to a 10x16-in. Good Roads Machinery Co. jaw crusher which discharges into the elevator leading from the track hopper. The product from the 1½-in. screen is chuted to a second conical of the same size having 3/16-in. perforations. This screen's rejections are chuted to a bin of 200 tons capacity from which they are loaded either into railway or dump cars.

All material passing through the 3/16-in. screen passes into a trough and is sluiced to a battery of two Dull separators in which are produced a coarse concrete sand and asphalt sand. These are mounted over the loading tracks so that their products can be loaded direct into railroad cars. When there are no cars available, the sand can be discharged into sluice boxes leading to a storage pile. Its recovery from storage is effected by a Portable Machinery Co. belt conveyor loading into 4-yd. dump cars. These are hauled to a tipple from which they are dumped into special truck-loading bins, located near the office and scale house. Gravel

The building at the left is the drying and screening plant; at the right, the main washing plant. The sluicebox at the right leads to a cone settling tank

Sand is brought to the washing plant in 4-yd. dump cars and is dumped into a grizzly-topped receiving hopper

End view of the main washing plant. Cars are loaded from the side and trucks from center of bins

is also drawn from the screening and washing plant bins and hauled to these truck-loading bins by locomotive and cars.

There are three plants that take care of the products of the sand and clay pits. These are known locally as plants Nos. 1, 2, and 3. The sand and gravel plant is referred to as No. 4. Nos. 1 and 2—one for washing, the other for drying and grading—receive the bulk of the material as they take care of all the sand sold for blast, foundry, and filtering purposes. They are the chief units of the entire operation and their products are the cleanest and the best graded possible.

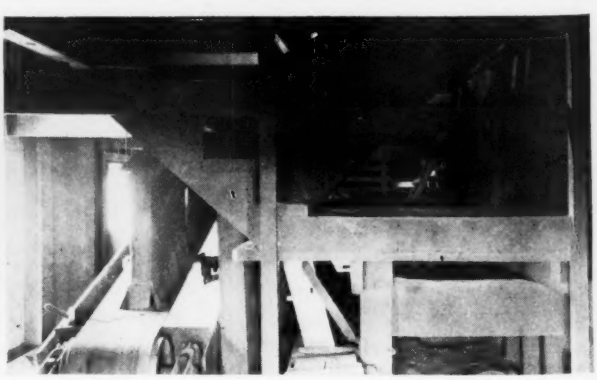
The sand is brought to the washing plant in 4-yd. Western dump cars that are dumped into a large V-shaped hopper from which it is fed, by a reciprocating feeder of the company's own design, into a 12-in. belt-bucket, elevator of 52-ft. centers. The elevator empties into a box—the head end of a sluice box—where it is met by a 4-in. stream of water. The water carries or washes the sand into a revolving screen of ½-in. perforations; this operation removes any such foreign materials as twigs, leaves, clay balls, or pebbles. That which passes through the ½-in. perforations is then chuted to a steel scrubber where it is thoroughly cleaned. This unit discharges into a second revolving screen having ¼-in. openings, the rejections of which are chuted to a small roll crusher. This machine's product is chuted to the same elevator which delivers from the hopper to the first revolving screen. All the sand passing through the ¼-in. screen is sluiced into an Allen cone settling tank. As it is discharged from this tank into a sluicebox, fresh water is applied which moves it to two Lewiston sand-washers where it receives its final cleaning. From here an 8-in. screw conveyor moves it to a storage pile located between the washing and drying plants.

Up to this point the sand has been only thoroughly washed and no attempt has been made to grade it other than to remove everything larger than ¼-in. It is next put

As the sand leaves the settling-tank a stream of fresh water carries the sand to the two log washers

Washed sand is stored between the washing and drying plants and is conveyed to the drying hopper by this bottomless scoop

Steam is furnished the drier by this horizontal boiler of 50-hp. capacity



Oversize from the electric vibrating screen is carried to a small revolving screen by a belt conveyor

The overflow from the washing plant is sluiced to this traveling settling tank. This product at one time was wasted

through the drying process, which is followed by its separation into five distinct sizes.

A 1½-yd. bottomless drag scoop is used for the removal and conveying of the wet sand from the storage pile to the drying plant. This scoop is operated by a clutch-controlled double-drum hoist powered by belt from the lineshaft of the washing plant. The scoop has as its guide two 20-lb. rails which extend from the pile to a point midway of the drier.

The drier is of the company's own design and was constructed "on the job." It is in two sections, each 22 ft. long, placed end to end, and is V-shaped. It greatly resembles an ordinary receiving or carloading hopper, excepting that it is of brick construction and is mounted on concrete foundations. At the top it is 5 ft. wide and the depth (to the point of the V) is 10 ft., giving it a capacity of 40 cu. yd. Drying is accomplished by means of 1-, 1½-, and 2-in. steam lines extending lengthwise through both sections. These are in staggered rows and are spaced from 6 to 8 in. apart. Steam is furnished by a 50-hp. horizontal, return-tubular boiler set up in an adjoining section of the plant.

Underneath the drier and approximately 6 in. from it, a 14-in. belt conveyor runs its full length. Spaced every 3 ft. in the bottom of the drier are sliding gates having extended handles so they they can be operated easily. When wide open, these gates permit the material to flow through an opening 12 in. long by 3 in. wide. Usually, however, when several are allowed to discharge at a time, they are never opened more than an inch, and when all are allowed to discharge, it is necessary to open each one only a fraction of an inch to keep the conveyor loaded.

The conveyor discharges into a 30-in. shaking screen with 3/16-in. perforations which in turn empties into a wooden hopper. The purpose of this screen is to catch any oversize that may have gotten mixed with the sand since leaving the other ¼-in. screen. From the hopper the material is fed to an enclosed chain-bucket elevator which takes it to the screens in the top of the building. There it is discharged into a chute leading direct to a Hum-mer electric vibrating screen fitted with 20- and 28-mesh sections. That which passes through the finer screen is known as No. 0 and the product of the 20-mesh section as No. 1. Both of these products are chuted to individual screw conveyors which deliver them to their respective bins.

The conveyor under the drier is fed through openings in the bottom every 3 ft. The arrow points to one of the feed holes

The rejections from the Hum-mer—that retained on the 20-mesh section—are chuted to a belt conveyor leading to a 30-in. revolving screen of two sections. The first section is of 14 mesh while the second is 6 mesh. These sizes are known as Nos. 2 and 3, and the rejections, passing a ¼-in. ring and retained on a 6-mesh screen, as No. 4. Each of these three sizes drops directly into bins underneath of 125-ton capacity each.

Practically nothing in the way of material is lost during the entire operation. It is easy to see from the description of the washing, drying and screening plant that the only material which escapes is the overflow from the cone settling tank. But this is not wasted. The water is sluiced for a distance of several hundred feet from the plant in a launder mounted 30 ft. in the air. This passes a wooden trestle 200 ft. long and 14 ft. wide from which is suspended a second cone settling tank.

The tank is mounted on a truck made of 10x10-in. timbers fitted with ordinary quarry-car wheels, and moves in the same manner as an overhead traveling crane. The launder is provided with gates at various points along the trestle so that the flow may be directed to the tank irrespective of its location on the trestle. Another sluicebox, for carrying off the overflow from the suspended tank, is mounted on the opposite side of the trestle and, of course, extends the full length of the structure. In this way, an unusually fine grade of asphalt sand is produced and economically stored.

The most interesting feature of the ar-

Even the overflow from the traveling settling-tank is valuable. This home-made box-type tank produces an unusually fine grade of sand

All sand to be shipped by rail is washed and graded at this plant. Note the V-shaped loading bins

rangement is that it permits the company to utilize as storage space otherwise useless ground, and with a minimum of expense. The sand is recovered by a crane and loaded either into railway cars or trucks as the trestle is in the center of a plot of level ground paralleling a railway track and roadway.

The company does not even let the overflow from this tank escape without trying to get more sand out of it. A homemade box-type settling tank, mounted at the edge of a worked-out area approximately 600 ft. from the cone tank, receives the overflow and as a result a still finer grade of sand is recovered which is sold at a higher price than any of the other grades. This sand is discharged from the tank into dump cars and hauled to either the railway car or truck-loading bins. The overflow from the box tank empties into a large ditch dug for that purpose where it is allowed to settle. In the near future the company plans to excavate and market the settled product, as it is an excellent grade of clay.

The two clays as they are dug in the pits are loaded into dump cars and hauled either to a railway carloading hopper or to the loading dock at the river. The latter is 1½ miles from the pits, and the cars are hauled by locomotives in trains of 10 each. The dock consists of a trestle extending a few feet over the bank so that the cars can be dumped directly into barges. The trestle is provided with an A-frame on which is mounted a small winch used for dumping and righting unusually heavy cars. This dock, of course, is for the loading of sand and gravel as well.

The other two plants serving the main pits are only for washing and screening refractory sand and concrete sand. One of these, plant No. 3, washes and screens the material; the other, No. 4, has no washing equipment and is designed only for the cleaning of dry sand. The former is equipped so that material can be screened dry or it can be put through a complete washing process.

As the sand comes from the pit it is washed through a 3/16-in. grating into a homemade washing box. From there it is flumed to a Dull separator mounted over a railway loading track. If no cars are available, the sand can be emptied into a flume and washed to a storage pile, where it is recovered by a crane and loaded into dump cars which carry it to bins at the main plant.

C. E. Dalrymple, secretary and general manager, who personally directs the operation

Thus, the Raritan River Sand Co. has an unusually flexible, efficient, and systematic operation. Producing 13 distinct products—2000 tons per day—from a deposit which many prospectors would have condemned after one look, is an unusual accomplishment. But it is all because C. E. Dalrymple, secretary and general manager of the company, took more than one look. It was his ability to see, several years ago, the possibility of developing under adverse conditions just such an operation and organization as he now directs.

Other officials of the company are Lewis Nixon, president, of New York City; and D. E. Corbett, treasurer, of Matawan, N. J. All the company's business is directed from the plant offices.

Western Fluorspar Deposits

RESULTS of an examination of the various Western fluorspar deposits, made by R. B. Ladoo, mineral technologist of the Department of the Interior, are set forth as follows in Serial 2480, just issued by the Bureau of Mines:

The production of acid fluorspar west of the Mississippi river from ore bodies now known probably will not exceed 100 tons annually. It is believed that not over 3000 tons of ground fluorspar can be annually produced, of which one-third will be low grade. It was estimated that the properties visited in the Western states can produce for a few years a maximum of 13,000 tons annually of a grade of gravel analyzing on an average 5 per cent or higher in barite, and 4000 tons of fluxing lump.

The farther Western steel mills, on account of the difficulty of obtaining fluorspar in gravel form, have been accustomed to use in their open-hearth furnaces both lump and gravel. Western mills likely will go on using Western fluorspar on account of high freight rates.

Special sizes of gravel are produced with this small portable screen. It is powered by a small electric motor

A Study of Lime Kilns

VIII. Types of Kilns—General Summary

By Arthur E. Truesdell
Consulting Engineer, Pittsfield, Mass.

IN the light of the preceding discussion of fuel cost and fuel economy it may be interesting and profitable to criticize some of the types of kilns in use with a view to bringing out their advantages, defects, and opportunities for improvement. We will review their principal features as relating to the major requirements just summarized.

Pot Kilns

Probably the oldest, and now practically obsolete in this country, is the "pot" kiln, which was built into the side of a convenient hill. This kiln is fired with wood, in fireplaces arranged in the limestone, generally three fires to each kiln. It is intermittent in operation, requiring from 7 to 10 days for emptying and filling the kiln with stone, and 7 for burning. It has few advantages, among which may be mentioned:

Ability to burn either hard or soft stone.
Uses a good proportion of quarry spalls.
Good quality of lime.
Low investment.
Low repairs.

Against these we must list:

Poor draft, due to low height.
Non-uniform heating.
Low output.
Difficult charging.
Difficult discharging.
Maximum discharge gases.
Hot discharge gases.
High radiation.

The disadvantages, especially the ones relating to heating efficiency, are so serious that the future has no promise for this kiln in this country. Even should the high loss from radiation and costly labor charges be reduced, the serious loss due to intermittent operation would remain.

Mixed Feed Vertical Kilns

The vertical kiln with mixed feed when properly designed meets nearly every requirement from a cost standpoint. This kiln generally uses anthracite or coke as fuel, introduced at the top of the kiln with the limestone. Among its good features are:

High output.
Cool discharge gases.
Cool lime.
Low labor charges.
Low repairs.
Low temperature operation.
Low investment.

Against these may be mentioned:

Soft stone cannot be used.
Ashes in the lime.
Small sized stone cannot be used.
Non-uniform heating or hard regulation.

This kiln is used almost exclusively in such chemical industries as recover carbon dioxide for use in their process, as the draft can be improved and the discharge gases recovered by the use of a suction fan or pump. The kiln does not appeal to the commercial lime manufacturer, as the lime is contaminated with ash. In all mixed-feed kilns we get the saving due to the use of heated air, but lose such fuel as does not come into intimate contact with air before meeting with carbon dioxide coming from the stone or becoming cooled in the upper part of the kiln. The draft is likely to become uneven through the kiln and the heating non-uniform. It must be under positive control and carefully regulated. Frequent or continuous discharge of lime is advantageous to capacity and the quality of lime.

A modification of this type, much used in Europe for both cement and lime, is the Aalborg kiln. The fuel (coal) is introduced directly into the heated zone of the kiln by ducts from above instead of being mixed with the raw materials at the top of the kiln.

Another form is the Mount kiln now being introduced. This kiln pays especial attention to the continuous feed of stone and discharge of lime and uses producer gas for fuel in order to avoid ash in the product. The gas is fed into the heating chamber directly just below the hot zone. The kiln is tall and equipped with mechanical devices for the handling of stone, lime, and fuel.* The good points of this kiln are:

High output.
Cool discharge gases.
Cool lime.
Easy discharging.
Low temperature operation.
Absence of ash in the lime.

While the disadvantages are:

Soft stone cannot be used.
Small size stone cannot be used.
Non-uniform heating or hard regulation.
High repairs.
High investment.

This is a kiln of some promise as the capacity and heat efficiency are high, although subject to the combustion defects common to mixed-feed kilns. It has been pointed out that the gaseous fuels can be most efficiently burned after premixing with the air for combustion. This kiln does not allow such premixing as the gas is introduced directly into the heating chamber and burned by the air ascending through the hot lime below. The gas pressure in addition to the draft must be carefully controlled. The mechanical features involve heavier repairs than the ordinary plant and more intelligent workers.

"Patent" Kilns

The usual form of kiln for the manufacture of commercial lime is our old friend, the vertical kiln with outside furnaces, known to the last generation as the "patent" kiln. Originally designed for wood, it has been adapted to use coal more or less successfully. It is more efficient than its predecessor, the pot kiln, and handles materials easier. Many of these kilns have been designed by their owners, who have incorporated varying amounts of knowledge, prejudice, and luck and reaped accordingly. They have perhaps overstressed the importance of a knowledge of local conditions and materials, however necessary that may be. This kiln has no marked advantages, except perhaps in:

Easy charging.
Low repairs.
Low investment.

On the other hand, we find:

Inability to burn soft stone.
Inability to burn small sized stone.
Maximum discharge gases.
Hot discharge gases (in the shorter kilns).
Hot lime (or "coolers" where heat is lost).
High radiation.
High labor.

There is constant improvement in the design of this kiln from year to year. Labor in many cases can be reduced by mechanical handling of materials. Kiln economy can be improved materially by building them tall, with closed tops and

*Wood, George B.; "Fine Art of Lime Burning," Rock Products, July 2, 1921. Rockwood, N. C.; "New Rockland Lime Plant," Rock Products, June 17, 1922.

suction fans. Designs can probably be worked out for using the waste heat of the lime to preheat the air for combustion. Producer gas can be premixed and burned in a furnace adapted for it. Pulverized-coal and fuel-oil furnaces, with means for modifying the high temperatures of the products of combustion, are not impossible of application. The moderate capacity of this kiln and its low initial cost make it the most popular type.

Hoffman Ring Kiln

The Hoffman ring kiln has enjoyed some European favor. A continuous horizontal chamber having removable partitions allows a tall stack centrally located to draw the air for combustion through the hot burned lime and the discharging gases through the cold stone. After a section is burned the partitions are changed so as to include fresh stone in the heating draft. Materials are placed in the kiln and removed by hand. Its advantages are:

Ability to burn either hard or soft stone.
Cool discharge gases.
Cool lime.
High output.
Low repairs.

Its disadvantages are:

Ash in the lime.
Cannot use small sized stone.
Hard kiln charging.
Hard kiln discharging.
High investment.

This is the first kiln on our list that shows fuel economy with ability to burn soft stone. The contamination with ash and the high labor cost in this country have precluded its use here, although one or two were tried some years ago. Notwithstanding that handling devices might possibly be devised to reduce the labor cost materially, the indications are that improvements in the other types of kiln will prevent any further development of this one.

Tunnel Kilns

The Dressler tunnel kiln has been quite successful on porcelains, which require a higher heat than limes. For such use the kiln is very expensive, being 300 ft. long and built with carborundum and silica brick in the heated zone. The materials are carefully placed on cars in such a way to secure uniform heating. To place limestone on the cars in a similar way would involve considerable labor, so that it becomes very questionable whether a cheap material like lime can be burned in such a kiln economically, although the heating efficiency is high. The advantages and disadvantages are about the same as for the Hoffman kiln.

Rotary Kilns

The rotary kiln as developed for cement is finding an increasing use in lime burning. Crushed limestone is introduced into the upper end of a slightly inclined steel tube lined with firebrick, made to slowly revolve. The rolling crushed stone passes through the hot zone under the gas current of the products of combustion going in the opposite direction and drops from the lower end of the tube as lime. The kiln modifies vertical kiln practice radically and has interesting possibilities. It appeals because it can:

Burn either hard or soft stone.
Makes excellent lime because of uniform heating.
Can use small sized stone.
Easy kiln charging.
Easy kiln discharging.
High output.

On the other hand, we find:

Maximum discharge gases.
Hot discharge gases.
High radiation.
High investment.
High fixed charges.

Although the mechanical equipment involves increased repairs, the temperature at which the kiln is operated has a large bearing on the life of the lining and so the cost of kiln repairs. The disadvantages can be greatly modified by the use of heat-conserving devices such as preheaters for the stone or boilers for the production of power. As the kiln uses small sized stone it can run at a lower temperature than any kiln using large sizes, although the tendency is to force the temperature as much as the stone will stand in order to get the higher output. In this kiln the combustion chamber and the heating chamber are identical. Being a straight flue, the combustible gases do not always find their oxygen at the proper temperature and so pass out unconsumed. Efficient combustion requires careful control of fuel, air and draft with the method of burning adapted to the fuel in use. As the raw material can be passed through the hot zone at varying speeds, high heats are not necessarily injurious to the product. For this reason fuel oil and pulverized coal can be used in the same way as for cement. The rotary kiln has a high capacity. Properly designed, it should prove a popular kiln where conditions are suitable.*

Finale—Kiln Design an Art

It is seen that in the design of a lime kiln there is difficulty in securing in a single kiln all the desirable elements. For example, small sized stone may interfere with good draft, or good draft may spoil uniform heating. Economy, too, imposes a limit on the installation cost of the kiln and its eventual operation. A kiln suitable for high-magnesium stone many times proves a failure on high-calcium rock. And so it goes.

In designing or recommending a kiln, the weight or value of the different elements must be determined from a study of the local conditions as regards stone, fuel, power supply, market, etc. For example, a lime plant located near a coal mine need pay less attention to fuel costs than one at a distance; but might, on the other hand, be compelled to consider carefully labor costs due to the competition of the mine for men.

It has been clearly shown that a lime kiln to be efficient must be designed and operated to conform to the characteristics of the stone to be burned and the fuel available. The raw material and fuel will determine to some extent the size and style of kiln. The size of the furnace depends on the heating requirements of the stone and its design on the kind of fuel. The heating chamber of the kiln must conform as fully as possible to conditions which will secure uniform heating with good draft.

In general, it may be said that at the present time the greatest advance to be made in kiln design has to do with combustion and the application of modern furnaces to the kilns. Radiation is also an item which should be sharply looked after, as it is accountable for severe losses in most kilns. The heat losses vary in magnitude and relative importance in different kilns and each type should be strengthened where weak. While fuel is the largest item in the cost of kiln operation, labor cost, repairs, and fixed charges should not be lost sight of. In any works of magnitude, the kiln used should be decided upon by the combined judgment of the plant superintendent and an experienced engineer. The magnitude of the savings possible make wise advice very cheap in this connection.

Valedictory—The Broad Outlook

Our industries are interested in obtaining an abundant supply of lime at the lowest reasonable cost, and they look to the lime manufacturer to furnish it. Up to date the carbonate has been the most available raw material, and, due to its wide distribution in nature, probably always will be. The reduction to oxide requires the application of energy in definite amount, as we have seen. This has been hitherto supplied by the use of heat. Heat, however, because it easily flows through all substances and so becomes dissipated, is known as the lowest form of energy into which the other forms degenerate. For economical reasons, then, it might be an advantage to apply the energy needed in a different form. Possibly our good friend Electricity may serve us here some day. Although the modern chemist is finding out new things about the composition of matter and the structure of the atom every day, there is no indication as

*Truesdell, Arthur E.; "Lime Burning in the Rotary Kiln," Rock Products, March 25, 1922. Warner, Irving; "Rotary Kiln Experiences," Rock Products, July 29, 1922.

yet as to how this may be done, although electricity can be used of course to generate heat almost anywhere. We would like to change the potential heats in the fuel and lime without losing a lot in the form of specific heat. It seems probable that we shall use kilns in our process for many years to come.

This being so, it is up to us to work out the application of our heat in the most economical ways and thus conserve our resources to the upbuilding of civilization of which, in some ways, we may be justly proud. It is the hope of the writer that this review may stimulate interest in that most vital problem of our industry—The Elimination of Waste.

(Concluded)

A Comparison of Fuels for Lime Burning

W. S. DICKIE, engineer in charge of the cement, chemical and metallurgical equipment of the Vulcan Iron Works, Wilkes-Barre, Pa, in contributing his comparison of fuels for lime burning, writes ROCK PRODUCTS as follows:

"While it has taken me some time to compile this table, it is not intended to be the last word in comparison of fuels. I have sent it to a number of engineers and manufacturers, hoping that I would receive criticism and comment which would be constructive in making an *absolute* criticism. So far, I regret to say that I have found almost everybody I have written to has been prejudiced in one way or the other. Probably my 'first guess' is as good as I will be able to obtain."

COMPARISON OF FUELS FOR LIME BURNING

Assuming { Coal at 13,000 B.t.u. per pound.
Bituminous producer gas at 140 B.t.u. per cubic foot.
Fuel oil at 144,000 B.t.u. per gallon (7½ lb. per gallon).

Assuming { Ratio of lime to coal at 4 to 1, or 500 lb. coal to 2000 lb. lime, or
6,500,000 B.t.u. per ton of lime, which equals 6,500,000÷140=
46,429 cu. ft. producer gas, or 6,500,000÷144,000=45 gal. oil.

Assuming { Coal at $8 per ton—oil at 6½ cents per gallon.
Labor at $4 per 8 hr.—electricity at 3 cents per k.w.h.

Assuming { Kiln burning 100 tons of lime per day of 24 hr.

Cost of Pulverizing 25 Tons Coal—Storage System

Coal for fuel—25 tons at $8	$200.00	
Drying coal—.35 tons	2.80	
Labor—8 hr. at 50 cents	4.00	
Power—475 kw.-hr. at 3 cents	14.25	
Supplies and repairs	4.00	
Total	$225.05	Per ton of lime $2.251

Cost of Pulverizing 25 Tons Coal—Unit System

Coal for fuel—25 tons at $8	$200.00	
Labor—One-half of 8 hr. at 50 cents	2.00	
Power—525 kw.-hr. at 3 cents	15.75	
Supplies and repairs	1.75	
Total	$219.50	Per ton of lime $2.195

Cost of Feeding 4500 Gal. of Fuel Oil

Oil for fuel—4500 gal. at 6½ cents	$292.50	
Labor—One-half of 8 hr. at 50 cents	2.00	
Electricity, steam and air	1.60	
Supplies and repairs	.70	
Total	$296.80	Per ton of lime $2.968

Cost of Gassifying 28 Tons of Coal (89 Per Cent Efficiency of Producer)

Coal—28 tons at $8	$224.00	
Labor—One man at $4 (three shifts)	12.00	
Labor—One man at $4 (one shift)	4.00	
Steam—Coal at $8	10.75	
Supplies and repairs	3.50	
Total	$254.25	Per ton of lime $2.543

Powdered Coal—Storage System	Advantages—Low price of coal in most localities. Disadvantages—Presence of dust. Liability of explosion. High first cost of installation. Contamination of product. Loss in calorific value in storage.
Powdered Coal—Unit System	Advantages—Freedom from dust explosions. Low first cost of installation. No drying necessary. Disadvantages—Contamination of product. Loss in calorific value in storage.
Oil—	Advantages—Cleanliness. Easily handled. Low first cost of installation. No ash handling. No loss in calorific value. Disadvantages—High price in most localities.
Producer Gas—	Advantages—Gas can be utilized more efficiently. No smoke. No contamination. Disadvantages—Loss of part of energy in coal. Stand-by loss. Most troublesome.

Arkansas Experiments With Rock Phosphate

MARTIN NELSON, vice-dean and director of the University of Arkansas, Fayetteville, Ark., writes that the Agricultural Experiment Station there has been making a technical investigation of the availability of phosphate in rock phosphate, especially in acid soils, and has been working with acid soils of this character.

"Little was known," he writes, "regarding its availability until we undertook this research. We find that crops take up phosphoric acid readily in acid soils, and we find, too, that the application of lime tends to neutralize the acidity and reduces the amount of phosphoric acid the crop gets."

New Illinois Quarry Company Ready to Do Business

A MEETING of the stockholders of the Kiggins Quarry Products Co. was held at the court house in Hillsboro, Ill., recently, according to the Springfield (Ill.) *Journal*, which states: The company is incorporated under the laws of Illinois for $100,000, and all the authorized capital stock of the company to be disposed of at this time has been subscribed for. This was the first meeting of the stockholders of a company recently organized to develop the quarry property formerly owned by M. T. Kiggins, located one mile east of Litchfield, between the Illinois Traction system and the Big Four railroad.

This company will quarry high grade calcium limestone suitable for all classes of concrete, including highways, as well as ballast, which is used by all railroads, and also a stone used by the steel industries for the refinement of iron ore. In the details of the organization of this company elaborate plans were made whereby they expect to specialize in a high grade limestone for agricultural and horticultural purposes, as tests made at the University of Illinois show this stone to rank among the best produced in this state.

The following directors were elected: M. T. Kiggins, Earl B. Nichols, Glenn E. Rynearson, A. Loucks and Joe Major.

After brief remarks by the newly elected directors the meeting adjourned, after which a meeting of the board of directors was called. Development plans were discussed and approved, and the following officers were elected to serve for one year: President, M. T. Kiggins; vice-president, Glenn E. Rynearson; treasurer, Alden Snyder; secretary, Joe Major; general manager, Earl B. Nichols.

Mr. Rynearson at present is the district engineer of materials for the eighth highway district of this state with headquarters at East St. Louis and has been connected with the state highway department since 1919. During the war he served with the Engineering Corps of the A. E. F., and previous to that time was plant control chemist with the Sandusky Portland Cement Co. at Dixon, Ill.

Mr. Nichols was electrical engineer and assistant superintendent of the Tomkins Cove Stone Co. at Tompkins Cove, N. Y., for eight years and manager of the quarries of the Callanan Road Improvement Co. near Albany, N. Y., for two and one-half years and comes here from the Lake Shore Products Co. at Sandusky, Ohio, the latter company having an output of 5000 tons of stone a day.

The work of rehabilitating the present property is progressing satisfactorily and much of the machinery is now on the ground, and it is expected by those in charge that the plant will be producing stone in the near future.

Plaster from Ground Limestone

II.—Limestone Chemistry Is Different From Lime Chemistry

By Cyrus Field Willard
San Diego, Calif.

WHEN I read the editorial note "in the box" with my first article where it was stated that ROCK PRODUCTS prints this article contrary to the advice of probably the best-informed man in the United States on "lime chemistry," I said to myself, "Oh, what's the use!"

It seemed to me then that it had been very foolish on my part to write or say anything at all on my discovery. I only consented to write the article for ROCK PRODUCTS at the request of its editor and complied because I supposed that the average person had sufficient penetration to perceive that a man engaged in private research—where he is obliged to test his facts again and again to be certain of them—would not have made the announcement of his discovery of such far-reaching nature, nor would it have been published in such a reputable and serious publication as *Chemical and Metallurgical Engineering* unless he was certain he had made the discovery he claimed.

Nowhere in my article did I claim that I was going to revolutionize the lime industry nor that the process was revolutionary, but the use of the word in the heading of the last article was due to the intuitive editorial mind, who put the head on the article in question.

While ruminating on these facts and "the best informed man in the U. S. on lime chemistry," of whose identity I have a shrewd guess, I was made glad by the receipt of a letter from probably the "best informed man in the United States on the chemistry of calcium carbonate," and they are two separate individuals.

He had previously written me after seeing the announcement in *Chemical and Metallurgical Engineering* that he and a friend "for several years" had tried every known substance to secure the results we had secured and at that time, with his expert knowledge on the subject, he had no doubt that I had done what I said I had done, and congratulated me on succeeding where he had failed.

He is a man whose patented chemical processes in the treatment of calcium carbonate are widely used and his comments in a letter recently receivd are as follows: "I will answer your letter after reading your article, but in the meantime want to say that, perhaps more than any one else in the country, I can realize and appreciate what you have been able to accomplish and the great achievement you have made. My very best wishes for your further success will always be yours and I will always be glad to be of any assistance in any way possible.

"It is a great pleasure for me to congratulate you and to rejoice in knowing that you were able to find the path where at least hundreds have failed."

Then comes this letter, which is intensely interesting:

"Your article (in ROCK PRODUCTS) was so beautifully and ably written and the subject is so very interesting that I got up out of bed after reading it to try and make some plaster, but there was no ———. It was doubly interesting to me because of being like a new and thrilling chapter of a story of which a part was known. It seems remarkable to me how these things can run along in almost parallel channels for so long a time without coming together.

AFTER mulling over the editorial note "in the box," published with my article in the June 30 issue of Rock Products, and getting sorer and sorer over my unknown friend (?) who advised you against its publication, I have received two such nice letters that I could not forbear arising in my might and slamming my typewriter for awhile, just as David banged Goliath. Here's the result.—The Author.

"About eight years ago, an acquaintance of mine showed me a small sheet which he said was made from a lime, talc, magnesia schist found on some property of theirs in northern New York. Later, he told me the owner of the formula was a chemist in the employ of a company near by, and that he had arranged to buy the formula. He had gone to see the chemist in a small town, taking with him the initial payment, but the chemist had failed to arrive. His body was found in a small pond midway between the plant and the town. As he was addicted to a drug it was supposed he took an overdose, fell off from a footbridge into the water and the formula died with him, the only clue being a random statement that one or more elements were wastes from the plant.

"This aroused the curiosity of a friend of mine and we found by pressing the schist with ——— and afterward submerging it in a ——— solution that sheet was produced similar to the original. Finally a switch was made to ———, changing the sodium of the silicate into a ——— and leaving a double silicate which sets up very hard. We've been using ——— where you perhaps have been using ———, and we have worked mostly on siliceous materials rather than limestone and also on molded goods.

"It is through the above experience that I can appreciate the wonderful work you have done in going back, so ingeniously and correctly, to the fundamentals and building up so correctly to such a fine outcome. Since I have an idea of how your compound is made up, I have more confidence and interest than ever."

Since lime (CaO) and limestone ($CaCO_3$) are radically different, and since the above comes from the man who, to my mind, knows much more about calcium carbonate and the subject at issue than the man who tried to dissuade the editor of ROCK PRODUCTS from publishing my article, I am well content to leave the matter to the adjudication of the readers of the publication and to the fact that we are doing exactly as we claim we do and will do so with any limestone of right fineness.

While it is only right this amount of space should be taken to remove the cloud of doubt cast on the opening article by the way in which the necessity for calm and unbiased judgment is editorially noted, yet to any one who is versed in the subject there is a wealth of suggestion to be read between the lines in the letter of the eminent chemist above quoted. It is possible that some day he may give his consent for his name to be mentioned as well as the materials he used.

Artificial Marble in England

AN English experimentor, Maurice Copisarow, has described in a recent issue of the *Journal of the Chemical Society*, an investigation of the colloidal and gelatinous state of calcium carbonate ($CaCO_3$)—limestone—in which he has proved that it is possible to recrystallize the material in several forms at will. For example, the application of pressure will change a amorphous $CaCO_3$ to a crystalline form. Pressure exerted in conjunction with favorable conditions will make an artificial marble that chemically and structurally is identical with genuine marble. Chemists *are* beginning to learn the secrets of geo-chemistry—the *chemistry of rock products.*

Nature, Preparation and Use of Pulverized Coal*

V.—Describing the Two Systems Generally Employed in the Preparation of the Powdered Coal

By Richard K. Meade
Chemical and Industrial Engineer, Baltimore, Md.

As to the preparation of the powdered coal itself, this will depend to some extent on the system which is used for burning. In general, two systems are employed. In one of these the coal is pulverized in a central plant and conveyed either mechanically or with air to the point of use. In the other system, the pulverizer is located adjacent to the furnace and the coal is blown into the latter by a current of air which passes through the pulverizer. The first installation is generally preferred where the quantity of coal to be pulverized is large, as it is currently believed that better power economy can be secured in a central plant. Cement manufacturers and most other large users of coal employ a central pulverizing plant, while most lime manufacturers, particularly where a single kiln is heated, employ the system in which the coal is pulverized and blown into the furnace with one operation. The latter system is particularly adapted to small installations and where a single furnace is to be heated.

Central Pulverizing Plant

The advantages of central pulverizing plants are: 1. Economy of labor and power, particularly where large quantities of pulverized coal are required. 2. Uniformity in the fineness and quality of the powdered coal. 3. Ample reserve of fuel supply to take care of varying furnace conditions and to compensate for time during which the pulverizer is inoperative due to repairs, etc. 4. Central point of distribution, as it is easier to distribute the pulverized coal than the raw coal to a large number of points.

The disadvantages of the central pulverizing plants are: 1. Not suitable for small quantities of pulverized coal. 2. Higher first cost. 3. Need of providing greater building or floor space. 4. Necessity of drying the coal before pulverizing.

Where the coal is pulverized in a central plant it is conveyed into bins at the furnaces and is fed from these bins as desired and blown into the furnace with air. In this system the central plant usually consists of some form of coal crusher in order that run-of-mine and large size coal may be handled, a drier and one or more pulverizers. The details of this equipment are given herewith:

Crushing the Coal

In the older plants the coal was usually crushed between rolls or in a small "pot-crusher." These latter most resemble an ordinary hand coffee mill in which the grinding is done between corrugated surfaces. They are suitable for small installations only and are generally considered inferior to the special forms of coal crusher now on the market.

Where a pair of rolls is used, these are usually provided with heavy spikes or teeth. These two-roll crushers, or "Cornish" rolls as they are sometimes called, care still much used in coal breakers where crushing of the coal finer than 2½-in. lumps is not necessary, but are not adapted to finer work.

As I have said, both of these forms of crusher are now largely superseded by special coal crushers of the single-roll type. Figs. 7 and 8 show a Pennsylvania single-roll crusher.* This crusher consists of a cast-iron frame on which is mounted a crushing roll which revolves against a concave breaker plate. The coal is broken between the roll and the plate.

The rolls are usually provided with teeth. The breaker plate is hinged at its upper end and is provided with arrangements for adjusting the clearance between the roll and the plate. The size of the product is regulated by this opening. The rolls are usually driven by means of a countershaft, mounted on the frame, through a pair of gears.

These machines are adapted to handle large lumps of coal and very wet material

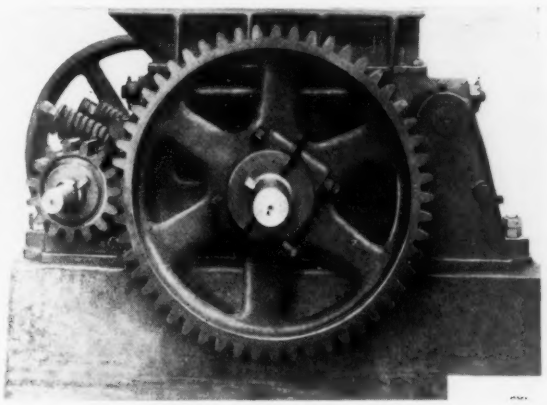


Fig. 7—Pennsylvania single-roll crusher

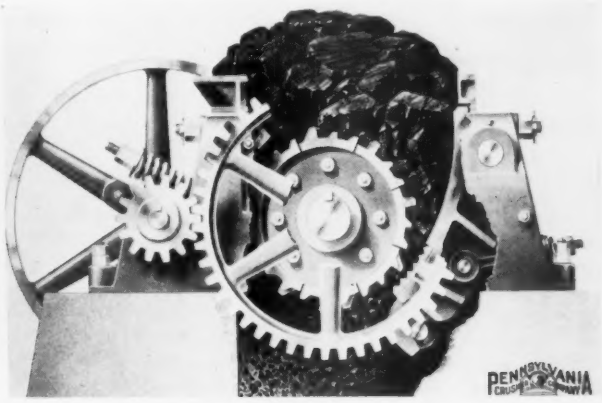


Fig. 8—Single-roll coal crusher, showing roll and breaker plate

*Pennsylvania Crusher Co., Stephen Girard Bldg., Philadelphia, Pa.

and will reduce the product to 1 in. and under. The fineness to which the coal should be crushed will depend on the size and type of pulverizer used, but 1-in. lumps are sufficiently small for any except the very small pulverizers.

The following are the usual sizes and capacities of single-roll crushers when taking Ohio and Illinois coal and reducing to 1-in. lumps and under. When operating on Pocahontas and other soft bituminous coal the capacity is about double that given in Table V. The capacity is also increased if a coarser product is desired.

TABLE V. CAPACITY OF SINGLE ROLL COAL CRUSHERS

Size crusher opening, inches	Approx. hp.	Capacity in tons per hour 1-in. material	1½-in. material
18x18	15	20	30
24x24	30	50	70
30x30	40	75	100
36x36	60	115	150

course, must be evaporated from the wet coal, and this alone utilizes a certain number of heat units. The temperature given in every case is that to which the heat produced by the burning of the coal will raise the products of combustion. For example, a coal containing 0.3 per cent water (as it frequently does after passing the drier) would give a temperature of 3200 deg. Fahr. when burned with 25 per cent excess air. The same coal containing 10 per cent water would only give 3000 deg. Fahr. when burned with 25 per cent excess air.

A much more real objection to the use of wet coal is the difficulty of keeping the flame going, particularly in a low temperature furnace, and this is, generally speaking, the point in this consideration to which attention should be paid.

The theoretical quantity of heat necessary to dry coal is given in Table VI. By dividing this heat by the calorific value of the fuel to be employed, the theoretical amount of fuel needed can be found. By dividing this in turn by the efficiency of the drier, the approximate amount of coal required with varying percentages of moisture can be found.

TABLE VI. HEAT REQUIRED TO DRY COAL

Moisture in coal before drying	Pounds of water per 2000 lb. of dry coal	Heat required to raise to 212 deg. Fahr. and evaporate water*	Heat required to raise water and material to 212 deg. Fahr. and evaporate water
1	20	22,360	95,655
2	41	45,838	119,133
3	62	69,316	142,611
4	83	92,794	166,089
5	105	117,390	190,685
6	128	143,101	216,396
7	151	168,818	242,112
8	174	194,532	267,827
9	198	221,364	294,659
10	222	248,196	321,491
11	247	276,146	349,441
12	273	305,214	378,509
13	299	334,282	407,577
14	325	363,350	436,645
15	353	394,654	467,949

*Heat required to raise 1 lb. of water to 212 deg. Fahr. and evaporate it is 1118 B.t.u. Specific heat of coal taken at 0.24, on which basis 73,295 B.t.u. are required to raise 2000 lb. of coal to 212 deg. Fahr.

For instance, if the drier has an efficiency of 75 per cent (when the heat required to raise the material is considered as work to be done) and the fuel a calorific value of 13,500 B.t.u., then the theoretical fuel required for drying one ton of a coal containing 5 per cent moisture is found by dividing 190,685 by 13,500 to be 14 lb. and the approximate amount based on a drier efficiency of 75 per cent is found by dividing 14 by 0.75 to be 19 lb.

The drying temperature should not be allowed to exceed 212 deg. Fahr. by any considerable degree, as otherwise some of the volatile matter of the coal will be lost. If the coal is kept at about this temperature there is no danger of driving it off.

Several forms of drier are now used for drying coal. The simplest of these is a properly designed direct-heat drier. Other forms in common use are the Ruggles-Coles drier and the Matcham or Fuller-Lehigh drier

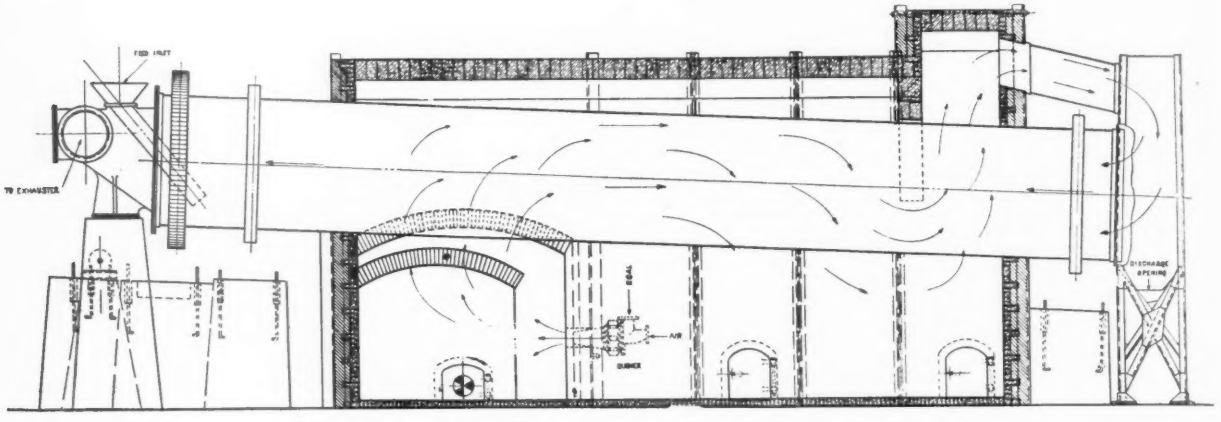


Fig. 9—Fuller indirect-fired rotary drier heated by pulverized coal

Drying the Coal

In order to get the greatest efficiency out of the pulverizing machinery it is necessary to dry the coal so that it does not contain more than 1 per cent moisture. Still better results can be obtained if the moisture is reduced to about ½ per cent.

For cement burning and for most metallurgical purposes where the stack gases leave the furnace at a high temperature there is a slight economy in dry coal, aside from the need of doing this in order to pulverize it. For example, if the gases leave the furnace at a temperature of 2500 deg. Fahr., every pound of steam carries away 2600 B.t.u., while at 400 deg. Fahr. the average temperature of drier waste gases, the steam only carries off 1300 B.t.u., or about half as much. It is only fair to say, however, that with coal containing 10 per cent moisture, this would only represent a loss of 1 per cent of the heating value of the coal, so that this objection is theoretical rather than practical. Similarly, where high temperatures are required, it is theoretically easier to obtain this degree of temperature by the use of dry than wet coal. The water, of

Fuller-Lehigh Drier

The Matcham, or Fuller-Lehigh, drier was developed in the Lehigh district of Pennsylvania and is used quite extensively in the cement industry. It was the design of the late Charles A. Matcham of Allentown, Pa. This drier with some modifications is now on the market,* and in this latest form it consists of an inclined cylinder (Fig. 9) mounted on steel tires which revolve on rollers. The cylinder is turned by means of a girt gear and pinion at an approximate speed of 1 to 4 r.p.m. The inclination of the cylinder is approximately ⅝ of an inch to the foot and it revolves partly in the brick housing which contains the furnaces. The hot gases pass up around the cylinder and thence through a short flue to the discharge hood and from this up through the cylinder. Draft is provided either by means of a stack or an exhauster. The latter is to be preferred.

The coal is fed in at the upper end of the cylinder and, owing to the inclination of the shell, the material is gradually moved forward as the cylinder revolves until finally it reaches the lower end of

*Fuller Engineering Co., Allentown, Pa.

the cylinder, where it drops out into a hopper and from this latter it usually is spouted to the boot of an elevator.

Z-bars or other forms of lifters are bolted to the inside of the shell and as the cylinder revolves these lift the coal and drop it in a steady cascade through the hot gases from the combustion chamber which are passing through the cylinder. This exposes a large surface of coal to the drying action of the gases and tends toward efficient drying.

This drier is made in various sizes. These are given in Table VII together with the power required to operate and the capacity (based on coal having 10 per cent extraneous moisture reduced to 1 per cent) as stated by the manufacturer.

TABLE VII. CAPACITIES OF THE FULLER DRYERS

Size		Capacity per hour, tons	Power to operate, hp.
Diameter	Length		
3 ft. 0 in.	20 ft. 0 in.	2	5
3 ft. 0 in.	30 ft. 0 in.	4	8
3 ft. 6 in.	30 ft. 0 in.	6	10
3 ft. 6 in.	42 ft. 0 in.	7.2	11¼
4 ft. 6 in.	30 ft. 0 in.	8	12
4 ft. 6 in.	42 ft. 0 in.	10	15
5 ft. 6 in.	42 ft. 0 in.	14	17
6 ft. 0 in.	42 ft. 0 in.	20	20
6 ft. 6 in.	50 ft. 0 in.	25	24

The Fuller-Lehigh drier can be arranged to use pulverized coal as the fuel, or firing can be done by hand grates. Pulverized fuel is preferable since, by reason of the more uniform furnace conditions which obtain highest capacities and greater economies result when it is used; also, the full time services of a fireman and ashman can be dispensed with. The feeder and burner need only one adjustment to take care of the drying conditions which exist at the time. No further attention need be paid to the burner or feeder unless the operating conditions fluctuate between wide limits.

(To be continued)

Gypsum in Agriculture*

A Permanent and Economical System of Soil Fertility

By Dr. Frank A. Wilder

President, Southern Gypsum Co., North Holston, Va.

NITROGEN, one of the most important, and certainly the most expensive form of plant food to purchase in chemical form, is effectively and cheaply supplied to the soil indirectly by the use of gypsum.

The legumes, as is generally known, are the hosts of nitrogen-secreting bacteria, and the legumes respond tremendously to a sulphur fertilizer like gypsum. Moreover, the gypsum has a very stimulating effect on the nitrogen-gathering or nodule-forming bacteria of red clover roots, as shown by Pitz of Wisconsin[1] and others.

Potash, which is abundant in most soils, and which, in insoluble form is present even in the first 6 in. of surface soil equal to the needs of hundreds of years, is made soluble without waste in sufficient quantities by the reaction of gypsum on the potash silicates. This action is assisted by turning under a green crop occasionally.

Many soils are deficient in phosphate and this deficiency may be supplied most cheaply by the use of raw rock phosphate. The solubility of raw rock phosphate has been called in question by the champions of the more expensive acid phosphate. If the rock phosphate is finely ground, however, and as offered to the trade at present its mechanical condition is excellent, and especially if it is turned under with a green crop, like clover or beans, there is sufficient ground for believing it abundantly soluble. Indeed the Illinois system of agriculture as advocated by Hopkins[2] and as successfully practiced throughout that state shows that rock phosphate is sufficiently soluble even though the precautions suggested above are not carefully observed.

The sulphur essential to the legumes which are the source of the nitrogen supply, and which contributes direct plant food to numerous crops, is best and most cheaply furnished by gypsum.

Acid phosphate is expensive as compared with gypsum and raw rock phosphate.

Raw sulphur is effective, but it rapidly sours the soil and this tendency must be constantly checked by the use of lime. The sulphur must first be transferred into lime sulphate by chemical reaction in the soil, whereas gypsum, a neutral salt, is itself lime sulphate.

Except for garden plots and truck farms where the large returns per acre justify expensive mixed fertilizers, it is in the interests of economy and efficiency to fertilize through legumes, together with the natural rock fertilizers suitably ground; gypsum and rock phosphates.

Lime is essential also to keep the soil in an alkaline condition, which makes it congenial to most crops.[3]

Experiments by the United States Department of Agriculture show that gypsum has given remarkable increases in the yield of cotton.[4]

The results are shown in the table given. The following were the costs per ton of fertilizer used:

Nitrate of soda	$50.00
Sulphate of ammonia	62.00
Acid phosphate	14.00
Ground bone	26.00
Rock phosphate	9.00
Floats	8.00
Basic slag	12.50
Sulphate of potash	60.00
Bone black	22.00
Wood ashes	5.00
Gypsum	8.00
Marl	.50
Lime	6.00

The value of cotton in the table was taken at 10 cents a pound. The test plots were usually one-tenth of an acre and were distributed through North Carolina.

GYPSUM
RESULTS OF FERTILITY TESTS WITH COTTON SOILS

Kind of fertilizer used	Total area	Fertilizers per acre Used Pounds	Fertilizers per acre Cost Dollars	Average crop increase per acre Pounds	Average crop increase per acre Dollars	Average gain per acre Dollars
Nitrate of Soda	73	160	4.00	64.0	6.40	2.40
Sulphate of Ammonia	17	128	3.97	58.2	5.82	1.85
Acid Phosphate	181	296	1.90	69.8	6.98	5.08
Ground bone	14	279	3.63	92.8	9.28	5.65
Rock phosphate	6	706	3.18	4.0	.40	3.58
Floats	25	201	.80	16.7	1.67	.80
Basic slag	4	230	1.42	1.0	.10	1.52
Boneblack	3	500	5.50	132.7	13.27	7.77
Muriate of potash	36	98	2.16	34.5	3.45	1.29
Sulphate of potash	6	112	3.36	21.2	2.12	1.24
Kainit	161	292	1.75	32.3	3.23	1.48
Wood ashes	3	1,667	4.17	68.0	6.80	2.63
Cotton-seed-hull-ashes	12	271	4.61	41.6	4.16	.45
Lime	3	1,333	4.00	33.3	3.33	.67
Marl	3	900	.23	19.0	1.90	1.67
GYPSUM	11	195	.78	197.4	19.74	18.96
Salt	1	200	.80	8.0	.08	.88
TOTAL	559	.....	2.33	54.0	5.40	3.07

*Advance proof of Chapter X of forthcoming report of the Iowa Geological Survey on the Gypsum Industry and Resources of Iowa.

[1]Effect of Elemental Sulphur and of Calcium Sulphate on certain of the Higher and Lower forms of Plant Life. Jour. Agr. Research, Vol. 16, pp. 771-780, 1916.

[2]Soil Fertility and Permanent Agriculture, Ginn & Co.

[3]For a synopsis of recent literature on gypsum as a fertilizer see special Bibliography covering Gypsum in Agriculture.

[4]U. S. Dept. of Agriculture, Bureau of Soils, Bulletin 62, p. 10.

TABLE No. I

	Plot A test plot	(Quantities are per caballeria) Plot B	Plot C
Fertilizer used:			
Waste matter (cachazas)	.....	26,840 Klgs.	26,840 Klgs.
Ashes	.....	13,420 Klgs.	13,420 Klgs.
Calcium sulphate (gypsum)	.....	.....	5,368 Klgs.
Value of the fertilizer: Waste matter	.....	$134.20	$134.20
Ashes	.....	134.20	134.20
Gypsum	.....	.....	107.36
Total	.....	$268.40	$375.76
Yield (arrobas)	63,784	94,000	177,952
Difference of yield as compared with the test plot (arrobas)	.....	30,216	114,168
Value of this difference, figuring 100 arrobas of sugar cane at $7.50	.....	$2,266.20	$8,562.60
Net gain, deducting the cost of the fertilizers	.....	$1,997.80	$8,186.84
Difference of yield, comparing the plot which was treated with gypsum with the plot which was not (arrobas)	.....	.....	83,952
Value of this difference, figuring 100 arrobas of sugar cane at $7.50	.....	.....	$6,296.40
Net gain, deducting the cost of the gypsum	.....	.....	$6,189.04

NOTES:—The capital of $268.40 invested in waste matter and ashes produced in about 14 months $1,997.80 more than the test plot, or 744 per cent.

The capital of $375.96 invested in waste matter, ashes and calcium sulphate (gypsum) produced in about 14 months $8,186.84 more than the test plot, or 2,177 per cent.

The capital of $107.37 invested in gypsum produced in about 14 months $6,189.04 more than the plot fertilized with waste matter and ashes only, or 5,764 per cent.

(A caballeria equals approximately 33.33 acres.)

(An arroba equals approximately 25.4 pounds.)

South Carolina, Louisiana, Georgia, Mississippi, Alabama, Arkansas, and Texas. The greater part of the work was done between 1888 and 1893. The proportion of cases of success to cases of failure (number of tests over 110) was as 10 to 1.

On page 13 of the same bulletin is the following table:

Kind of fertilizer used		Total area	Fertilizers per acre Used Pounds	Fertilizers per acre Cost Dollars	Average crop increase per acre Pounds	Average crop increase per acre Dollars	Gain per acre Dollars
Cotton-seed meal	.....		(260)				
Kainit	.....	4	(347)	6.17	233.0	23.30	17.13
GYPSUM	.....		(210)				

The investigations of Kearney and Cameron[5] show that gypsum counteracts in a wonderful way the injurious effects of certain salts that are present in many soils. It is a veritable specific for black alkali, caused by the presence of sodium carbonate, as has been already pointed out. Magnesium sulphate, magnesium chloride, sodium sulphate, and sodium chloride are injurious to many important plants. In the presence of gypsum the endurable amount of these substances may be increased many times.

Kearney and Harter[6] experimented further and found that gypsum neutralizes the poisonous effects of salts. In the case of common salt or sodium chloride the resistance of the plant was increased as follows:

Lupine (white)	5 to 10 times
Wheat	5 to 10 times
Oats	9 times
Cotton (G. barbadense)	32 times
Beet	8 times

Similar beneficial results were secured with sugar cane in Hawaii. The use of gypsum to neutralize objectionable salts increased the yield of sugar 46 per cent.[7]

Remarkable results have been secured by the Cuban Agricultural Experiment Station.[8] The data given below were compiled by Dr. Mario Calvino.

Anhydrite can be used satisfactorily for agricultural gypsum provided it is very finely ground. This finer grinding is necessary on account of the fact that it is less soluble than gypsum. It is higher in sulphate and if its limited solubility is overcome by fine grinding it can be used without hesitation in making agricultural gypsum.

[5]Some Mutual Relations Between Alkali Soils and Vegetation: U. S. Dept. Agriculture Bulletin 71.

[6]Bulletin of Plant Industry, U. S. Dept. of Agr., No. 113.

[7]Experiment Station Hawaiian Sugar Planters Assn., Bulletin 11.

[8]Review of Agriculture: Commerce and Labor Official Organ, February, 1921, Havana.

Cement Price Stable

THE warehouses of a good many dealers are fairly well depleted of cement stock because they have refrained from ordering in advance of requirements. Most jobs which were held over from last year are now completed, and with the mid-summer quiet season at hand, cement shipments have been rather slow for the last few weeks. Yet even with shipments considerably under those of April and May, manufacturers report that they shipped 20 per cent more cement the first half of this month than during the same period of July, 1922. Manufacturers expect the demand to continue brisk this fall. The price remains steady at the $2 mill base which has been general since last October. It did not advance in the spring when other materials were increasing, hence no decline is in order now. The present level will probably remain firm throughout the year, or at least until after the peak load of fall shipments, after which a price reduction would be in order only if costs of production decline.—Tomkins Brothers *Trade Review*, July 21, 1923.

Unique Oklahoma Crushing Plant Under Construction

THE Tulsa Portland Cement Co., Tulsa, Okla., a new concern fostered by R. D. Long and Harry H. Bell, is building a unique crushing plant near Tulsa. It will have a No. 30 Kennedy gearless crusher as an initial breaker, a No. 49 gearless secondary and No. 37 gearless finishing crusher. But the unique part of the plant is the total absence of elevators and conveyors. Being a side-hill operation, gravity chutes and a special design have eliminated all need for conveying machinery.

Messrs. Long and Bell are prominent local business men. Mr. Long built the Muskogee Street Railway and was for several years its manager. The crushing plant was designed by W. J. Cavanagh, engineer for the Kennedy-Van Saun Engineering and Manufacturing Co., New York City.

The quarry property is a large tract of land about two miles west of Tulsa in a town called Lost City. This property is about two miles long and the biggest part of it is a hill about 200 ft. high, the lowest part of which is composed of shale, on top of which there is approximately 60 ft. of high calcium limestone, without any overburden to speak of, and the slope of the entire hill is approximately an angle of 45 deg

The plant is to be laid out with the primary set about 8 ft. below the quarry floor level and about 8 ft. from the edge of the floor so that the cars will dump into a pocket and the stones roll into the crusher without any violent movement. In this manner there will be no front chute required. There will be no wear on the crusher from the stone dashing against it, and there will be less bridging of rock and consequent delay in feeding, than if the stone were dumped direct from the car to the crusher.

At the discharge end of the No. 30 primary there will be a Kennedy shaking-bar grizzly through which the finished product will pass down the hill by gravity and the over-size will pass to the No. 49, which will in turn discharge over another bar grizzly, sending the oversize from this crusher to the No. 37 crusher.

The discharge from the last crusher, combined with the discharge from both grizzlies, will pass down the hill by gravity and enter the stone box which will discharge in equal quantities to the two rotary screens. These screens will be set on top of a bin, which will have an estimated capacity of 2000 tons, and the bin will be divided into five compartments, one for the dust and the other four for the stone in different sizes.

There will be two switches under this bin, on which the railroad cars will pass to be loaded. In the vicinity of Tulsa there is a great demand for crushed stone, so that this plant will have no trouble in disposing of its entire capacity, and as the stone is of a high calcitic content, it is Mr. Long's intention, as soon as the crushing plant is in operation, to erect a thousand-barrel-per-day cement plant.—W. J. C.

Central States Sand and Gravel Rate Case to be Reopened

Interstate Commerce Commission Asked to Rehear Merits of Sand and Gravel Industry's Demand for Lower Freight Rates

ON June 27, John S. Burchmore, of Borders, Walter, Burchmore & Collin, traffic attorneys, Chicago, on behalf of the National Sand and Gravel Association, filed a petition asking for a reopening and rehearing of the now famous case of the National Association of Sand and Gravel Producers vs. the Pennsylvania Railroad Co. et al.

This action is taken as a result of the meeting of the executive committee of the association in Chicago, May 16, and the subsequent unanimous approval by the board of directors of the association.

The case was originally prepared and presented by President Alex W. Dann, with the assistance of John S. Burchmore, Luther M. Walter and Edwin Brooker on January 16, 17 and 18, 1922. An account of this hearing appears in ROCK PRODUCTS of January 28, 1922, page 49, under the caption "Irrefutable Evidence Given of Unjustifiable Rates—Brooker Gets Six-Hour Grilling but Delivers Many Telling Blows."

Very soon after this hearing (in fact the decision had been made at the time of the hearing) the Interstate Commerce Commission announced a general horizontal cut of 10 per cent in all railway freight rates, and following this the I. C. C. issued a report and order denying any special reduction on sand and gravel. Subsequently the railroad and commerce commissioners of some of the individual states, notably Ohio, did order radical reductions of rates on sand and gravel, and the railroads have appealed these decisions to the Interstate Commerce Commission on the strength of the decision referred to.

In view of these facts, and the outstanding fact that on account of the forthcoming 10 per cent general reduction the merits of the case did not receive a very favorable reception at the original hearing, a petition for a rehearing has been made on the following grounds:

1. The report is erroneous in finding that the record affords insufficient basis for requiring a general reduction in interstate rates on sand and gravel in central territory.

2. The report is erroneous in finding that the rates assailed, *considered as a whole*, are not unreasonable, unduly prejudicial or otherwise unlawful and therefore in dismissing the complaint.

3. The report is erroneous in dismissing the entire case simply because not every rate assailed is conclusively shown to be excessive when the rates in general are so shown to be unreasonable.

4. The report is erroneous in stating that a finding of undue prejudice against gravel and undue preference to slag under the existing disparity of rates, which is admitted by the defendants to be discriminatory, would not be warranted by the record.

5. Upon further hearing, if allowed, complainants will prove by competent evidence that the present interstate rates are curtailing traffic and impairing the gross and net revenues and that reasonable reductions would increase the traffic and revenues of defendants.

Petition Purposely Delayed

The petition states further that:

It has been six months since the decision was made in this case. Despite the fact that in their opinion the decision of the commission was erroneous, the complainants did not rush in with a hasty petition for rehearing, but have allowed sufficient time to elapse for another test of their ability to do business under the present rates.

Now the sand and gravel season of 1923 is half over. The experience of the complainants in the past months has forceably demonstrated that their traffic is unable to stand the rates permitted by the commission's decision to stand.

While the complainants were of the opinion that the conditions portrayed to the commission in the hearing of January, 1922, were such as to justify substantial relief with respect to the interstate rates on sand and gravel, a record made today would not only serve to emphasize that conditions then prevalent have not changed, but would also show that the circumstances under which the traffic moves today have made the situation so acute that now there is even a greater necessity for according the complainants relief from the burden of unjust and excessive rates.

Effect on Intrastate Rates Important

Of course, the interstate rates on sand and gravel are not near so important to the industry as the intrastate rates, for probably much more than 75 per cent of the traffic in central states is intrastate. But it must be borne in mind that under the act now in force, the commission first fixes the proper level of interstate rates and then in the manner and under the circumstances outlined in the act, requires intrastate rates to conform to the proper interstate level. If the state commissions of Indiana, Ohio, Pennsylvania and other states lying wholly, or in part, within the territory covered by this case, in carrying out their functions of making rates are expected to try to make the state rates conform to the interstate rates, we submit that the Interstate Commerce Commission should see to it that its own action in fixing interstate rates is sound, well considered and founded upon practical considerations. With all proper deference, we submit that if the Interstate Commerce Commission takes a case involving interstate rates on sand and gravel, sweeps the evidence aside, declares the complainants have not made a complete case as to all the rates and therefore dismisses the proceeding, it would hardly be fair in subsequent cases involving intrastate rates, to prevent the state commission from making revisions necessary to preserve the traffic of shippers whose plants were constructed and equipped to supply the demands by shipments by railroad and who cannot compete with road-side pits under the present high freight rates.

Not Necessary to Show Every Rate Too High

The commission in its report herein, by Division 4, dismissed the complaint with the observation that "the record affords insufficient basis for requiring a general reduction in rates on sand and gravel in central territory," and with the finding that "the rates assailed, considered as a whole, are not unreasonable, unduly prejudicial, or otherwise unlawful." We construe the decision as a broad, sweeping declaration that there is not enough in the record to force the conclusion that every rate on sand and gravel is excessive and prejudicial; therefore that the commission must dismiss the case. This is not the way the commission customarily deals with these matters, particularly in the general rate investigations involving all, or substantially all, commodities and classes. In such cases it accepts general evidence treating conditions broadly when presented by the railroads (and by shippers) and grants or approves rate advances thereon. Admitting, for purposes of argument, that the record in this case is not a complete detailed record, which deals with all the individual rates but rather is one filled with illustrations of the rate structure and its effect, we ask the commission to bear in mind, *first*, that the burden of proof under the statute rests upon the defendants to justify the reasonableness of the present rates and not upon the complainants to show the present rates unreasonable; and *second*, that in the previous cases and former decisions of the commission, there is nothing to uphold the measure of the present rates except the same kind of general showing by carriers with regard to these rates which the commission now regards as insufficient when coming from the complainants against these rates.

In other words, any infirmity in this record ought to be charged up against the defendants, but the commission's decision charges it up against the complainants, and contrary to the theory of the statute, puts the burden of proof strongly upon the complainants. This is despite the fact that in the decision in *Ex Parte* 74, known as *Increased Rates*, 1920, 58 I. C. C. 220, at page 250, the commission itself called attention to the fact that the rates on sand and gravel had been subjected to a much more severe advance under General Order 28 than had been made on other commodities, including the competitive rates on slag, and intimated that the sand and gravel rates in Eastern territory (meaning Official Classification territory) were out of line with the rates in other parts of the country and a revision of them should have consideration.

While we would admit that the burden of proof which rests upon the defendants as a matter of law would be met sufficiently in the ordinary case by showing that the rates simply bear the general advances made by the Director General on June 25, 1918, and under *Ex Parte* 74, we submit that this cannot be true in this particular case since the rates here involved were given an extraordinary measure and percentage of advance under General Order 28, which in turn resulted in a further extraordinary advance under *Ex Parte* 74.

Hints and Helps for Superintendents

Adjustable Grizzly

THE GRIZZLY shown in the accompanying illustration is mounted between the discharge spout of the primary crusher and the receiving hopper of the secondary crusher in the new plant of the Leathem D. Smith Stone Co. at Sturgeon Bay, Wis. As

This grizzly, located between the primary and secondary crushers, is adjustable and can be set to conform with the primary crusher's adjustment

can be seen, the grizzly is made up of concave manganese-steel bars which were spaced, at the time the picture was taken, 4 in. apart.

Upon close observation, one can see how the bars are held in place. Each bar is supported at the upper end by two ⅞-in. bolts and a flat plate, serving in U-bolt fashion. The bars also rest on two 1-in. rods, one at the upper end and one at the lower end, which are fitted with pieces of 1¼-in. pipe. These pieces of pipe are of various lengths, from ½ in. to 1½ in., so that by removing or adding lengths, the spaces between bars are shortened or lengthened as desired.

An adjustable grizzly is a necessary piece of equipment at any crushing operation where it is necessary to adjust the crushers from time to time. At the Smith plant, when the primary crusher is set to discharge at 4 in., the grizzly can be set in proportion. As this installation is an experiment on the part of the Smith company, its application will be watched by other producers with a view of making a similar installation.

Portable Water Tank

HEREWITH is illustrated a tank mounted on the truck of a quarry car, which is used by the Louisville Cement Co., at Speed, Ind., to carry water from the plant to the steam shovels in the quarry.

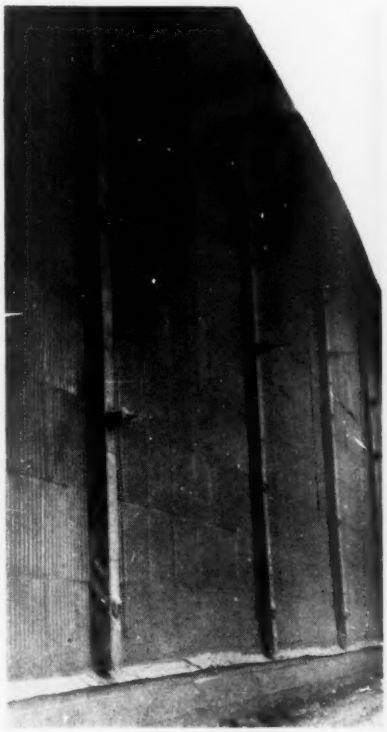
Because of its chemical analysis, the water from the nearby stream can not be used in the boilers and owing to the great distance from the pure-water wells, it is not economical to pipe it; also, in pumping to the quarry, much expense is incurred and considerable time is lost by moving the lines before and after blasts. Both systems were tried and it was found much less expensive to carry the water than to pump it.

The tank shown was made in the company's own shops and is constructed of 3/16-in. boiler plate. It is 4 ft. high, 5½ ft. in diameter and is held in place on the flat car by two ¾-in. rods—one on either side—with a 2x6-in. timber across the top.

Spring on Tie-Rod

ANOTHER of the many little kinks at the plant of the Southern States Portland Cement Co., Rockmart, Ga., is the use of coil springs on the tie-rods in the building used for the storing of hot materials.

The rods, at either end, pass through 10x10-in. timbers, in holes that are slightly larger than the rods, so that when the bin is filled the walls can give. The springs are of such size that they do not compress until the timbers are near the breaking point. Experience on the part of officials of the company has shown that, with its particular type of buildings, no timbers could



By putting a heavy coil spring on each end of the tie-rods, an expansion of 1 in. is allowed for each wall

This little tank car is used to haul pure water to the shovels from the wells at the plant

be found that would withstand the pressure when all the bins were filled. By using the springs on each end of the rods the walls give way sufficiently to allow an expansion of 1 in. on either side.

Old Shovel Bucket Serves as Blasting Shelter

IN ROCK PRODUCTS, April 21, 1923, the use of an old boiler as a blasting shelter at the quarry of the Louisville Cement Co. at Speed, Ind., was illustrated, and herewith is a picture of a similar shelter at the trap-rock quarry of John S. Lane & Son, Westfield, Mass. The board roof and back are evident intended as sun shades to keep the interior from reaching the temperature of an oven during the warn summer weather. This quarry is a side-hill operation. The rocks breaks up into unusually small fragments.

Incidentally, the powder and caps used for shooting boulders are kept on the side of this shelter farthest from the shooting.

Rope Saver for Well Drills

F. W. SCHMIDT, JR., of the Morris County Crushed Stone Co., Morristown, N. J., recently called the editor's attention to a clever kink used by the superintendent of their Millington, N. J., quarry to save "burning" well-drill ropes.

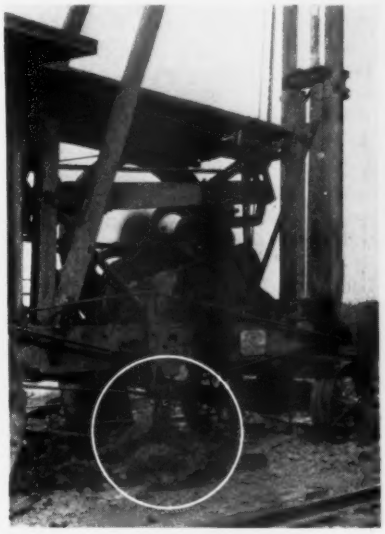
An old piece of hemp rope is unraveled, as shown in the first of the accompanying illustrations, and the hemp fibre thus obtained is wrapped around the drum and between the rope wound on the drum as shown in the second view. This serves as a protection to the drill rope, gives the drum a better bite on the rope, and altogether is a life-saver for the rope.

It is not very pretty to look at, but the results obtained are well worth while.

Incidentally the Morris County Crushed Stone Co. is one of few trap rock producers who have had excellent success in the use of well drills on very high faces. It is by just such ingenuity as that illustrated that they have adapted well drills to big-blast quarrying on an extensive scale.

Don't Let Your Men Crimp Blasting Caps by Biting Them

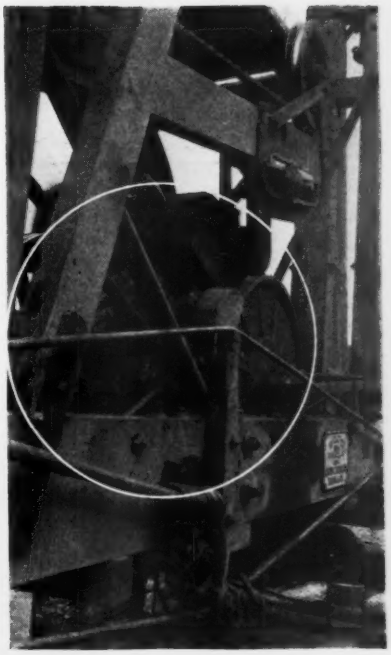
ANOTHER miner has been killed from attaching a blasting cap to his fuse by biting the cap down with his teeth. The latest victim was Charles Bergstrom, a prospector in the Pacific Northwest, who



Ravelings from an old hemp rope used for preventing the "burning" of drill rope

was found dead in his cabin with his head horribly mangled and holding a fuse in his hand.

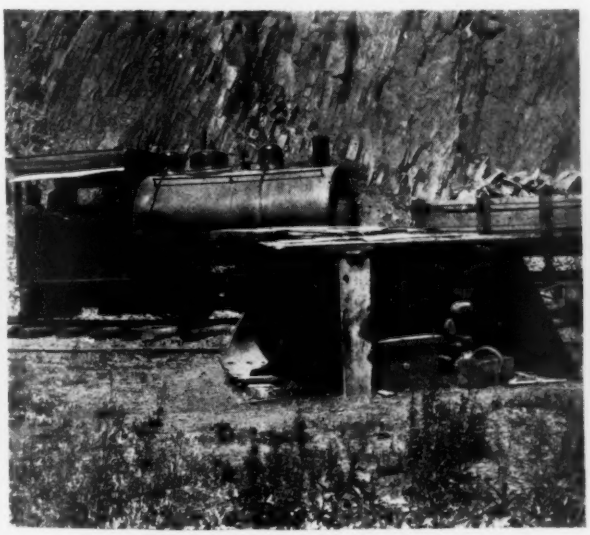
All explosives manufacturers and cap



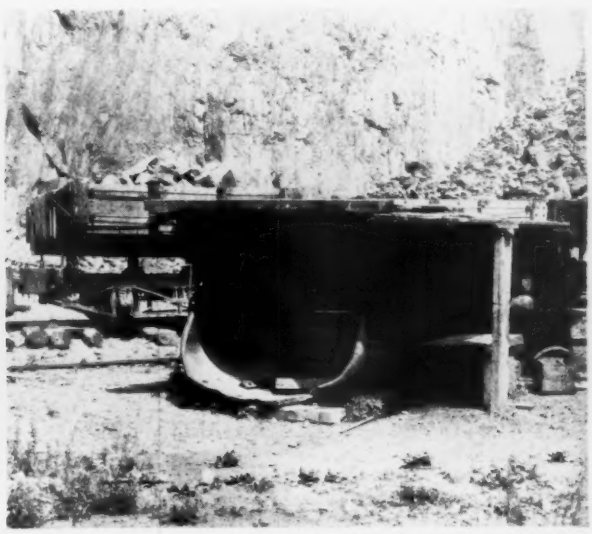
Rope ravelings wrapped around drum and rope prevent burning

manufacturers warn their customers not to crimp blasting caps by biting them, but to use a cap crimper, a tool prepared for this purpose, which sells for about 50 cents apiece. From motives of false economy or thinking that they know better than the explosives manufacturers, many miners and other users of explosives continue to bite their caps and every now and then one of them gets killed.

A blasting cap is necessarily filled with sensitive ingredients. In their efforts to get their customers to use cap crimpers, the explosives manufacturers are actuated only by humanitarian motives and to promote greater efficiency in the use of their product.



Old steam-shovel bucket used as a blasting shelter



Another view; John S. Lane & Son quarry at Westfield, Mass.

Western Cement Rates*

Mileage Basis with Exceptions Under Discussion—Manufacturers Divided on Limitation of Exceptions

A REOPENED hearing of Docket 8182 and Fourth Section Application 12217 was begun before Examiner Pitt at Chicago, July 16. The question of limitation of fourth section relief was taken up with regard to Western cement rates. In announcing the reopening of these cases the commission said that no limitation or circuitous routes had been fixed and that some of the carriers to which relief had been granted had routes that were extremely circuitous, and on such routes the rates might not be reasonable compensatory, as required under the amended fourth section. Several instances had been brought to the attention of the commission in which it seemed doubtful that the rates were compensatory. The commission, therefore, wished to reopen the case with a special view to ascertaining if the rates were compensatory and if it was advisable to fix a limitation to the granting of relief or circuitous routes.

Two forms of limitation were suggested by the commission upon which it desired to have the carriers submit testimony with respect to their propriety and feasibility or as to any modification or proposals of other plans. The two proposed plans are as follows:

(1) That the relief shall not apply to circuitous routes that are more than a certain per cent longer than the short line between competitive points, the percentage to vary according to the length of the haul involved; for example, 125 per cent longer when the short line distance does not exceed 25 miles; 100 per cent where the distance via the short line is 26 to 50 miles, and 80 per cent where the short line distance is from 50 to 100 miles, etc., and

(2) That the relief shall not apply when the rate which is to be established by the circuitous line to meet short line competition is less than a certain per cent of the rate under the mileage scale for the distance via the circuitous line between the competitive points involved; for example, if the rate under the mileage scale for the distance between the two competitive points via a circuitous route is 30 cents, the relief would not apply if the rate proposed to meet short line competition between the said points is less than 80 per cent of the normal rate of 30 cents.

In opening the testimony for the carriers, L. C. Mahoney, for the Western Trunk Lines, said that, following the decision of the commission to reopen 8182, the carriers had held a conference with a view to determining the best sort of evidence to present and that a second meeting had been held with the cement shippers. Because the decision was that the shortest practicable route be used in determining the distance over which the mileage scale would apply, he said, there were literally thousands of fourth section violations in existence at present. The previous decision on 8182, he said, had provided that the mileage scale be used, after which the carriers had made a test by applying the so-called Lorenz scale to one month's business, as actually handled. The scale was also applied experimentally over the shortest workable route and over a so-called air line route, which was still shorter, whenever disregard of operating connections could make it so. Supplemental order 52 I. C. C., 225, followed, in which the commission ruled that the shortest workable route should be used, allowing it to apply over three lines where necessary. Because of the fact that the operation over three lines would yield less revenue than operation over a single line, as the scale had been figured, the commission then allowed the use of the so-called Scale 2 rates, which were made 10 per cent higher in order to yield the additional compensation.

There was difficulty in specifying routings in the tariffs, he stated. Restrictions to the shortest workable route did not always yield the best results, he said, as, for example, where a congested district could be avoided by using a slightly longer routing. With the help of the cement shippers, he said, they had worked out a scheme of rates whereby rates were fixed for three classes of points—common points, where there were two or more carriers; junction joints, where there were two or more branches of the same carrier, and base points, which were not in excess of 25 miles from a common point or a junction point.

On several lines, he said, where there was a more direct joint route between a point of production and certain destinations, there was difficulty, because the joint haul distance fixed the rate over the longer single haul line. This brought fourth section difficulties at points on the single haul line which were local to the point of production and intermediate to the destination and yet more distant from the point of production than the destination point that fixed the rate.

He said that if the long and short haul clause was to be observed, there would be instances where routing over the shorter joint haul would take business away from a carrier that both originated and delivered it, because it could be hauled over a shorter route by not following the line of the originating carrier in instances where the joint haul was less circuitous than the one line haul of the originating carriers.

Continuing his testimony July 17, Mr. Mahoney further stressed the impracticability of fixing any limitation of fourth section relief based on mileages as producing an excessive amount of difficulties in making up the tariffs. He cited instances where one route would be cut by several other lines in which each junction threw the mileage adjustment out of line and caused large numbers of fourth section violations. He said that, unless wholesale relief was given, as practically in effect at present, traffic would have to be restricted to the route by which the rate was fixed or some sort of plan used to grant relief only up to a certain percentage of difference in rates between any two points in question.

With some such arrangement as that, he said, and with the fact that to the scale was added 10 per cent by the commission to compensate for longer hauls, a way out of the thousands of existing violations might be found.

A definite proposal of this sort was offered by A. F. Cleveland, assistant freight traffic manager of the Chicago & Northwestern. His proposal was that fourth section relief be given at all intermediate points at which the rate did not exceed by 30 per cent the rate to a point beyond. This, he said, would get away from what appeared to be a two years' task of figuring mileages in the event the limitation was made on a mileage basis. The rule could be placed in effect within 30 days, he said, and would immediately clear up the whole situation.

Mileage Rates Satisfactory

He said that this case was generally regarded as a most important one that would destroy the whole structure of mileage rates placed into effect by the commission on cement unless some such workable scheme of fourth section adjustment were permitted by the commission. He insisted that these mileage rates were radically different from any other freight tariffs and that they had been forced by the commission over the protests of practically every carrier and shipper of cement. He said, the older system of rates by grouping was generally preferred.

The carriers, he said, believed and had contended that such mileage scales should apply only over workable routes and that the present scale had been fixed rather on air lines at the demand of the commission. The result, he said, had been that the whole aim of the commission to create relationships between producing points had been defeated and so many fourth section viola-

*Reprinted from "The Traffic World," July 21, 1923.

tions created that they could never be defended.

There was general satisfaction, he said, both on the part of the carriers and the shippers of cement, so long as the mileage scales were left under a wholesale relief from fourth section violations. In answer to the examiner's statement that the commission was required to fix some sort of limitation on the relief granted, he said he believed with many traffic men that any attempt to limit the relief on a basis of mileage would wreck the whole tariff and precipitate the cement litigations all over again. The commission would then have no other alternative than to return to the old system of groups, he said. There was complete unity, he said, among the carriers and shippers in these beliefs.

The tariff as it stands today, he said, was ideal from the point of view of the shipper and the carrier, so long as the fourth section situations could be disregarded. It left all routes open, which meant much to the shipper in times of car shortages and traffic difficulties. There had been no instances, he said, that he had been able to find, where the tariff had been abused, although, with no fourth section restriction, abuse was possible. But he believed that if the amount of circuitous haul the carrier wished to participate in were left to the shipper and the carrier it could be worked out as the practical needs of each situation demanded without abuse of the tariffs.

With regard to the use of circuitous hauls that would not be compensatory, he said, he believed this could be left to the carriers without danger and that it would be an almost impossible task to take up all circuitous hauls and find whether or not they were justly compensatory.

Compensatory Rates on Cement

He said that, on his line, there were several circuitous hauls under this tariff, but he did not believe his line engaged in any that were not made sufficiently compensatory by the provision of the tariff which had 10 per cent added to the first estimated rates in order to cover the situation. He cited the earnings of the Northwestern on cement for 1922 as 1.22 cents per ton mile on the average haul of 143 miles, in substantiation of his belief that the rates, as at present applied, were compensatory for such circuitous hauls as were in use.

O. T. Cull, for the C., M. & St. P., cited several of the most circuitous hauls on the line and said that, while some of them seemed hardly compensatory, they were rarely used, but were desirable to have open for the convenience of shippers in times of traffic difficulties.

Representatives of several other carriers, at the request of the examiner, appeared to cite the most circuitous hauls on their lines. All of them concurred in the testimony of the previous witnesses with regard to the impossibility of a workable scheme of fourth section relief limitation based on considerations of mileage, due to the immense difficulties of figuring all the mileages.

Representatives of the Universal Portland Cement Co. testified to the same general effect with regard to the difficulties of limitation of relief as had been set forth by the carriers. They stated that they were in agreement with the carriers in regard to this tariff and supported them in the contention that the application of the proposed rule of limiting to a 30 per cent difference in rate between any destination and an intermediate point would be the most practical solution. They introduced exhibits to show the large number of fourth section situations that were created on several typical circuitous routes. Some of the extreme instances showed that the tariff could be applied over routes that were circuitous by more than 300 per cent of the route over which the rate had been fixed.

Continuing the testimony of the shippers July 18, representatives of several cement companies, including E. S. Gubernator and F. E. Paulson, for the Lehigh Portland Cement Co., supported the contentions in the previous testimony of the cement shippers and carriers as to the impracticability of limitation. F. W. Martindell, for the Nebraska Portland Cement Co., took the same position and went farther to state that, in his opinion, the present schedule of rates was amply high to compensate the carriers for any circuitous routes that the shipper would want to use. He made comparisons with the present rates on brick to show that the cement rates were at a high level.

The testimony of the cement shippers closed the hearing.

Sand and Gravel Company Has Sales Conferences

EVERY one is familiar with the annual sales conferences held by such companies as the National Cash Register Co., and others of that class. They are a recognized institution for promoting team work and for the education of salesmen. So sand and gravel readers will be interested to know that at least one of their brother producers is big enough and live enough to have conferences of its sales force—the McGrath Sand and Gravel Co., of Lincoln, Ill. A local newspaper, in noting this conference, says:

"The present season has been a tremendous advance in this rather new industry on account of the extensive hard road building, street paving and large amount of public and private construction.

"The McGrath company, which has its general office at Lincoln, started with a small plant at Mackinaw 15 years ago, loading two or three cars per day. They now have washing and screening plants at Mackinaw, Pekin Chillicothe, Forreston and Joliet. An idea of the developing of this business can be obtained from the facts that the company is now shipping about 125 cars per day.

Cement Association Promotes Walter B. Elcock

THE Portland Cement Association has appointed Walter B. Elcock as assistant general manger of its Southeastern offices. Mr. Elcock joined the staff of the association in 1914.

During 1915 he was division engineer in Colorado, Utah, Wyoming, and Idaho. In 1916 he was district manager at the Atlanta office. Except his two years' service as major of infantry during the World War, Mr. Elcock has been with the association continuously since 1914. His headquarters will continue to be at the Atlanta office.

Association district offices have recently been opened in New Orleans, Jacksonville, Birmingham and Memphis. These offices with the one to be opened in Raleigh, will increase the services of the association to users of cement and concrete in Tennessee, North and South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana.

British and Danish Cement Used in North Carolina

ACCORDING to advices from Wilmington, N. C., the steamship Emergency Aid was due to arrive there from London about the middle of the month carrying the first cargo of cement ever imported there from England.

The steamship will dock and discharge at the terminals of the Wilmington Compress and Warehouse Co., and it was stated by one of the terminal officials that this will be the first of several cargoes of cement to be imported into Wilmington from England for the Southern Power Co. In fact, it was said that the importation of cement from England into Wilmington for distribution to points in North and South Carolina is new business, which is expected to increase to large proportions.

In addition to the cement cargo of the Emergency Aid there is also en route to this port another such cargo aboard the Danish steamship Indianic from the port of Aalborg, Denmark.

This cargo is also for the Southern Power Co. and is to be discharged for distribution at the Wilmington terminals. The freighter is expected to arrive about the middle of the present month.

A Correction

IN the July 14 issue of Rock Products the article on page 31 describing the American Agricultural Chemical Co.'s plant at Pierce, Fla., stated that all the conveying equipment in the storage plant proper was furnished by the Portable Machinery Co., Passaic, N. J. It should have read Conveying Weighter Co., New York City.

High Rates in Central States Are a Real Menace

Railroads in other Sections Use Comparisons with such Rates in Order to Justify Increases Elsewhere

By Edwin Brooker, Traffic Expert
Munsey Building, Washington, D. C.

THE writer has been afforded the opportunity during the past several years to study the different freight-rate structures on sand, gravel and crushed stone. He has participated in various proceedings involving the level of rates on these commodities before several of the state commissions as well as the Interstate Commerce Commission. He has handled negotiations with the railroads for specific rate adjustments and through individual conferences with railroad officials and correspondence, is thereby in a position to pass along to producers of sand, gravel and crushed stone a few facts for their consideration.

Density of traffic plays an important part in fixing the general level of rates. Through compilations which can be made from annual reports of the carriers, it can easily be shown that there is a greater density of traffic in the territory east of the Mississippi and north of the Ohio rivers, than exists elsewhere in the United States. In Tift v. Southern Railway Co., 10 I.C.C. 548, 583, the Interstate Commerce Commission said:

> The general rule is, the greater the tonnage of an article transported, the lower should be the rate. No rule is more firmly grounded in reason or more universally recognized by the carrier. It is because of the greater density of traffic north of the Ohio river in Central Freight Association territory and in the Eastern territory, that rates in general are made materially lower in those territories than in the Southern territory.

Commissioner Prouty, in Re Advances in Rates-Eastern Case—20, I.C.C. 243, 275, said: "Rates should decrease as density of traffic increases," and again in 22 I.C.C. 438 "and the fact that a region is comparatively thinly populated may justify higher rates."

It is common knowledge among railroad men and others familiar with traffic and transportation conditions in the United States that rates on all freight generally, in the Central States, are lower than in other territories, but this is not true as to rates on sand, gravel and crushed stone. On these commodities we find generally a higher level of rates than applies in other sections of the United States. A brief analysis of such rates with those applying in other territories may shed some light on the existing situation.

In the Central States we find varying rates based on the distance hauled. There is no established basis in effect. They are the outcome of rates established from time to time, some on the basis of charging all the traffic will bear, others based on competitive conditions, and still others based on mileage. The carriers use as a guide, when they can put it over an unsuspecting producer, a mileage scale, which is supposed to represent a maximum basis, and rates made on this scale may be published without authority from the Central Freight Association. It is not generally published in tariff form, and in case of emergency shipments, where no commodity rates in effect, the classification basis of Sixth Class applies. As a result of these conditions, we have high rates, and when compared with such higher rates, some low rates.

In Southern territory we find a different situation. There are numerous commodity rates in effect, applying chiefly to the large consuming markets, which have been established due to competitive conditions. A few illustrations of the level of such rates are shown in Table No. 1.

TABLE 1

From	Miles	Rates	Commodity
To Atlanta, Ga.			
Cinchaw, Ala.	135	$1.02	Gravel
Chattanooga, Tenn.	137	1.02	Gravel
Cooks, Ala.	162	1.02	Gravel
Vandiver Park, Ala.	170	1.02	Gravel
Montgomery, Ala.	174	1.06	Gravel
Cantelous Spur, Ala.	183	1.13	Gravel
To Birmingham, Ala.			
From	Miles	Rates	Commodity
Junction City, Ga.	223	$0.79	Sand
Mauk, Ga.	231	.79	Sand
To Chattanooga, Tenn.			
From	Miles	Rates	Commodity
Saulsbury, Tenn.	256	$0.90	Sand
LaGrange, Tenn.	265	.90	Sand
To Jacksonville, Fla.			
From	Miles	Rates	Commodity
Columbia, S. C.	305	$1.35	Crushed
Parkhill, S. C.	359	1.35	stone

In the absence of commodity rates, maximum mileage scales apply. These are published in tariffs and vary according to the state on intrastate and as to railroads on interstate traffic. Illustrations of these scales for some of the distances are shown in Table 2.

Southern carriers have for the past two years been endeavoring to establish a uniform maximum mileage scale to apply on state and interstate traffic. They have submitted this scale to the Georgia and Alabama commissions for approval, but no decision has been rendered. The Southern Railway has published the scale referred to on interstate traffic over its entire line. The Atlantic Coast Line Railroad has published the scale to apply interstate between points in Virginia and North and South Carolina. This particular maximum scale which Southern carriers as a whole regard as a proper scale to apply in Southern territory is shown in Table 3.

TABLE 3

Miles	Average weighted rates in Central states	Southern District maximum interstate scale
5	$0.68	$0.45
10	.76	.50
15	.82	.54
20	.74	.59
25	.87	.63
30	.96	.68
35	.94	.72
40	1.10	.77
45	1.00	.81
50	1.00	.86
55	1.04	.90
60	1.04	.90
70	1.34	.95
80	1.12	.99
90	1.21	1.04
100	1.34	1.08

It has been shown that on account of traffic density in the Central states that rates on all traffic are and should be on a lower level than in Southern territory—except on sand, gravel and crushed stone. No better comparison can be made between the rates than by taking the carriers' own figures, which were submitted in the form of an exhibit to the Interstate Commerce Commission at the hearing in the Central States complaint, Docket 13231, and the maximum interstate mileage scale which Southern carriers have adopted. The figures for the Central states represent the movement of 29,204 carloads of sand and gravel and are arranged according to mileage blocks and represent actual rates charged.

TABLE 2
Intrastate Scales

States	Distances 5	10	25	50	75	100	125	150	175	200
*Mississippi	47	47	55	55	70	78	94	94	110	117
*Florida	54	57	68	79	90	90	102	102	113	113
North Carolina	50	57	66	83	99	115	124	130	136	140
South Carolina	45	57	68	79	102	102	113	124	135	135
Tennessee	58½	58½	67½	85½	94½	103½	112½	112½	121½	130½
Georgia	53	60	72	83	100	116	125	131	141	147

*Road-building rates.

From the foregoing it will be noted that the rates in the Central states are much higher than the maximum interstate mileage scale in the South, and a comparison with rates shown in Table 2 will disclose the same results. Here we have a territory represented by Illinois, Indiana, Ohio, Michigan and Pennsylvania, the largest producing states of sand and gravel in the United States, and which should have lower rates on sand and gravel than any other territory, being assessed higher rates.

Why Central States Rates Are a Menace

In every proceeding before the Interstate Commerce Commission and state commissions involving Southern rates, the carriers present exhibits showing the rates between points in the Central states, and by comparisons with their own rates, attempt to convince these bodies that higher rates should be established or no reductions should be made in Southern rates. They used these tactics before the state commissions of Mississippi, Georgia and Alabama.

The writer was confronted with a 12-page exhibit of rates between Central states points in a hearing before an examiner of the Interstate Commerce Commission at Atlanta Ga., on July 13, 1923, at which time the railroads were endeavoring to support suspended increased rates on clay gravel from C. & W. C. pits to Georgia points. It is particularly difficult to combat testimony and evidence of this kind and there is no question but what it has an effect on the decisions rendered.

The entire industry, in my opinion, is very much interested in supporting any move to secure reasonable rates in the Central states, because future relief for them in the way of lower rates depends much on lower rates in the Central states, if not to prevent actual increases in other rates.

How Can the Problem be Solved?

The Central states complaint, Docket No. 13231, has been decided by the Interstate Commerce Commission against a reduction. The fact that it is not easy to consider a situation where we have so many varying rates for the same distance may have had something to do with the adverse decision. The big majority of the rates should be materially reduced, but it is evident that the same relative reduction should not be made on the lower rates as may be made on the higher rates. It is a question whether any efforts to secure a flat reduction or a percentage reduction will ever meet with success.

When we consider that all other territories have in effect maximum mileage scales to apply in the absence of published commodity rates—and such maximum scales are even lower than the rates generally in the Central states, not taking into account commodity rates which are lower than the maximum scales — there is ground for thought as to whether a maximum published scale, which represents a basis beyond which the rates would be excessive and unreasonable, could be successfully applied in the Central states and bring about sufficient relief from the present high rates.

Not Advocating Mileage Basis

There has been so much agitation against the mileage scale from some quarters that one hesitates even to mention it, but there is a vast difference between a milage scale and a maximum scale. What I refer to is a maximum mileage scale which will reduce rates in excess thereof and permit commodity rates to be published as heretofore on a lower basis where competition requires such lower rates. If the maximum mileage scale of Southern roads were applied to the present situation, it would reduce present rates in the Central states on an average of from 25 to 40 per cent.

I do not want it understood that I am advocating such a basis, but there is certainly room for thought as to whether the best means to bring about lower rates in the Central states is by seeking a general reduction in all rates or a maximum established beyond which the rates are excessive and unreasonable. Density of traffic in the Central states warrants a lower maximum level than in Southern territory.

In another article in the near future, I shall attempt to review freight rates on sand and gravel in Western territory as compared with the level in the Central States.

Missouri Highway Commission Trying to Batter Down Cement Price

ACCORDING to a St. Louis, Mo., newspaper of July 10 the State Highway Commission of Missouri may use its $2,000,000 appropriation for a cement plant as a club to get lower prices on cement than those it has been able to obtain thus far. The dispatch states:

"It is planned to call for bids on plant construction to be submitted in about 60 days. The state will not need much cement for its road building program before next year, as most of the work this year is grading and building bridges and culverts. Highway Commissioner Gary said he believed one or two plants could be erected in a year.

"If a single plant were built sufficient to manufacture enough cement to supply the state during the period 1924-28 inclusive construction period under the $60,000,000 bond issue, the cost would be about $2,000,000, according to one estimate.

"It would cost about $1,000,000 or $1,250,000 for each of two plants large enough to furnish the total amount needed, but it is figured that two plants erected in different parts of the state would effect a large saving in freight rates.

Plans Submitted

"The proposed call for bids as it was submitted to the commission today for approval by the engineering department, includes three different plans.

"Plan No. 1 is for bids for furnishing cement only, and offers a chance for the cement manufacturers to submit bids at lower prices than the commission has so far been able to obtain. These bids would be on a basis of supplying cement for the state's needs from 1924-28 inclusive.

"Plan No. 2 calls for bids for erecting a plant or plants for manufacturing cement required for the 1924-28 program, the commission to advance 50 per cent of the needed funds, the bidder to erect and operate the plant or plants.

"Another proposal under No. 2 plan calls for bids for erection of a plant or plants, the commission to advance all of the funds and the bidder to advance the working capital and operate the plant. Under this plan the funds advanced by the commission would be refunded on a barrel basis.

Builder to Ultimately Buy Plant

"Still another proposal under No. 2 plan calls for bids for the erection of a plant or with the commission to advance the funds as required, the bidder to furnish the working capital and operate the plant, and the bidder to specify the price at which the plant would be sold December 31, 1928.

"A fourth proposition, under No. 2, calls for bids for erecting the plant or plants, the commission to advance the funds as required and also advance the working capital. The bidder would erect the plant and operate it on a percentage basis.

"Under plan No. 3 one proposal is for the sale to the state of a plant or plants, the bidder to supply working capital and operate it, and to specify the price at which he would purchase the plant on December 31, 1928.

"A second proposal under No. 3 is for the sale to the state of a plant now located outside the state, the commission to furnish funds for its dismantling, removal and re-erection in the state, the bidder to do the work and furnish the working capital and operate it."

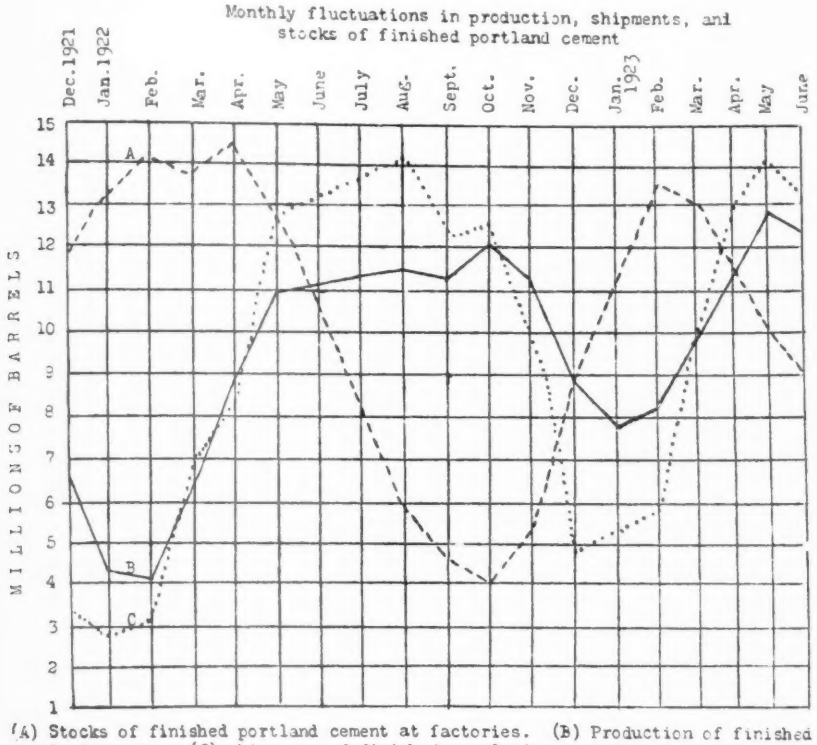
Calcined Phosphatic Limestone as a Fertilizer

IN a recent issue of *Soil Science*, E. Van Alstine describes experiments with phosphatic limestone as a fertilizer. Phosphatic limestone was calcined until all CO_2 was driven off. The CaO was reduced to a very fine powder but there was no evidence, either chemical or microscopic, that the condition of the phosphate granules had been appreciably altered. Extensive sand and soil culture experiments indicated that the calcined phosphatic limestone is no better than the pulverized product.

In all probability it was not as good as the pulverized raw rock because a good share of the phosphoric acid must have been driven off with the carbonic acid—CO_2.

Cement Output in June

THE statistics shown in the following table, prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for June, 1923, were made necessary by the lack of returns from three producers.



(A) Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) shipments of finished portland cement from factories.

Stocks of clinker, or unground cement, at the mills at the end of June, 1923, amounted to about 4,154,000 bbl. compared with 4,470,000 bbl. (revised) at the beginning of the month.

The imports of hydraulic cement in May, 1923, amounted to 88,480 bbl., valued at $162,877. The total imports in 1922 amounted to 323,823 bbl., valued at $628,846. The imports in May were, from Quebec and Ontario provinces, Canada, 35,304 bbl.; Norway, 29,948 bbl.; Belgium, 12,415 bbl.; Germany, 6952 bbl.; Sweden, 2526 bbl.; other countries, 1335 bbl. The imports were received in the following districts: Florida, 23,192 bbl.; Vermont, 13,154 bbl.; Georgia, 12,403 bbl.; New Orleans, 12,350 bbl.; St. Lawrence, 10,527 bbl.; Buffalo, 8871 bbl.; Los Angeles, 2526 bbl.; Rochester, 2109 bbl.; other districts, 3348 bbl.

The exports of hydraulic cement in May, 1923, were 103,634 bbl., valued at $355,299, of which was sent to Cuba 43,873 bbl.; to the other West Indies, 4731 bbl.; South America, 37,226 bbl.; Mexico, 7821 bbl.; Central America, 5370 bbl.; Canada, 1634 bbl., and to other countries 2979 bbl. The total exports of hydraulic cement in 1922 were 1,127,845 bbl., valued at $3,206,201.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JUNE, 1922 AND 1923, AND STOCKS IN MAY, 1923, IN BARRELS

District Commercial	1922 —Production, June—	1923	1922 —Shipments, June—	1923	Stocks at end of June		Stocks at end of May
					1922*	1923	1923*
E'n Pa., N.J., Md.	2,827,000	3,155,000	3,219,000	3,415,000	3,165,000	3,082,000	3,342,000
New York	539,000	648,000	584,000	676,000	825,000	730,000	759,000
Ohio, W'n Pa., W. Va.	1,092,000	1,263,000	1,335,000	1,359,000	1,126,000	915,000	1,011,000
Michigan	717,000	747,000	903,000	863,000	586,000	433,000	549,000
Ill., Ind., Ky.	1,851,000	1,867,000	2,571,000	2,093,000	1,639,000	529,000	755,000
Va., Tenn., Ala., Ga.	544,000	647,000	609,000	663,000	334,000	192,000	208,000
E'n Mo., Ia., Minn.	1,238,000	1,224,000	1,701,000	1,447,000	1,238,000	1,299,000	1,522,000
W'n Mo., Neb., Kans. Okla.	806,000	866,000	862,000	768,000	798,000	1,027,000	929,000
Texas	275,000	334,000	330,000	368,000	236,000	201,000	235,000
Colo., Utah	243,000	276,000	230,000	276,000	177,000	178,000	178,000
Calif.	762,000	1,021,000	746,000	1,000,000	275,000	157,000	136,000
Ore., Wash., Mont.	351,000	334,000	380,000	379,000	319,000	476,000	520,000
	11,245,000	12,382,000	13,470,000	13,307,000	10,718,000	9,219,000	10,144,000

*Revised.

Lime and Slate to Get Main Attention of New Experiment Station

THE principal problems to be undertaken on the opening of the new non-metals experiment station of the Bureau of Mines, at New Brunswick, N. J., will be a continuance of the study of the difficulties met with in the quarrying and preparation of limestone and in lime manufacture, and a continuance of the work which has been in progress at the Tuscaloose station on mineral fillers.

The work necessarily will be limited, as the appropriation permits of the employment of three technical men only. Since considerable work has been done on lime and mineral fillers, it is felt that the greatest good can be accomplished by carrying through the work already well in hand.

In lime the most important portion of the work probably centers around efforts to utilize waste. There is reason to believe that improved methods of burning can be brought to the point where the smaller sizes can be burned.

It is possible that some work on slate will be taken up early in the life of the station. This is encouraged by the success which has attended large-scale pulverization of waste slate, and the increasing demand for this material, as a filler in asphalt, roofing materials, paint and rubber.

The problems of the non-metals are of such a character that field work is required in much larger proportion than laboratory work. The studies and the experiments must be carried on under operating conditions. For that reason Dr. Oliver Bowles, who will be in charge of the new station, believes it is better to expend the appropriation in a way that will allow all necessary field work. Consequently he must limit the personnel of the station to a mineral technologist and a physical chemist. In case co-operative arrangements can be made with the industries concerned, it will be possible to expand the work further.

LeGore Lime Plant Burned

THE plant of the LeGore Combination Lime Co., near Woodsboro, Md., was wrecked by fire to the extent of about $50,000, July 17. The fire originated in the boiler room and almost made a clean sweep of the plant. Two boiler rooms, a hydrating building containing valuable machinery, two large lime sheds, containing 3000 tons of hydrated lime, and an elevator fell prey to the flames. The loss is partly covered by insurance. The vice-president and general manager of the company is W. C. LeGore.

Reorganization of Orton & Steinbrenner Co.

THE Orton & Steinbrenner Co., of 608 South Dearborn street, Chicago, manufacturers of locomotive cranes, dipper shovels and grab buckets announces a reorganization of the company.

P. A. Orton, secretary and treasurer, has been promoted to president, succeeding H. G. Steinbrenner, resigned; H Mertz, assistant secretary, has been promoted to secretary and sales manager; H. Shaffer, purchasing agent, has been promoted to treasurer and purchasing agent; G. L. Niederst, chief draftsman, has been appointed chief engineer.

Mr. Orton received the degree of civil engineering in 1894 and master of science in 1896, from the University of Cincinnati. During the college year of 1894 he was assistant in the department of mathematics and during 1895 assistant in the engineering department. In 1896 he entered the employ of the King Bridge Co., Cleveland, in the estimating and designing department, which position he held until 1899, when he resigned to become engineer for Kaltenbach & Griess, consulting engineers at Cleveland. He held this position until 1902, when he was appointed chief engineer for the Interstate Engineering Co., Cleveland. He resigned in 1906 to enter into partnership with H. G. Steinbrenner at Chicago. When the company was organized in January, 1908, he became secretary-treasurer and general manager, which position he has held until his recent appointment.

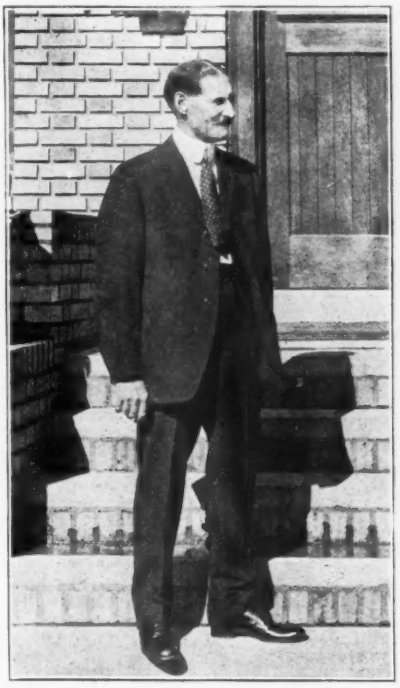
Mr. Niederst, chief draftsman, was educated at St. Ignatius College His business career started in 1900, when he entered the employ of the Cleveland Automatic Tool Machine Co. In 1901 he entered the employ of the McMyler Mfg. Co., in the engineering and inspection department, which position he held until 1905, when he was promoted to chief draftsman. In 1908 he resigned to go to Cuba. He returned to the United States in 1910, and was appointed chief draftsman of the company.

Mr. Mertz was educated at the University of Chicago and Armour Institute of Technology. He entered railroad service in 1910 with the Chicago, Milwaukee & St. Paul, where he was employed on surveying corps in Montana, Idaho, and Washington. Later he entered the employ of the Illinois Central in the same capacity and in 1912 he returned to the Chicago, Milwaukee & St. Paul as a designer and draftsman in the bridge department, with headquarters at Chicago. In 1914 he resigned to become an engineering draftsman in the engineering department of the city of Chicago, which position he held until 1916, when he entered the employ of Fairbanks, Morse & Co. as a designer of reinforced concrete coaling stations. He held this position until March, 1918, when he resigned to enter the employ of Orton & Steinbrenner Co. as a draftsman. In January, 1920, he was promoted to estimator cost accountant. In December, 1920, he was promoted to assistant secretary

Mr. Shaffer studied accounting at Northwestern University. His business career started in 1908, when he entered the employ of the Webster Mfg. Co. as an assistant in the cost accounting department, which position he held until 1910, when he was promoted to assistant to the purchasing agent. In 1913 he entered the employ of the Skillin & Richards Mfg. Co. as a cost accountant, but soon returned to the Webster company, where he was placed in charge of purchases. He entered the employ of the Orton & Steinbrenner Co. in 1916 as purchasing agent and accountant.

Death of President Keenan of National Slate Association

THE slate industry, the National Slate Association and his many friends alike have suffered a keen loss in the death of William H. Keenan, president of the National Slate Association and a member of



The late William Henry Keenan

the Keenan Structural Slate Co., Bangor, Pa. He died after only 12 hours' illness from an acute heart attack on July 20. The funeral took place at the home of his brother, Philip Keenan, at Bangor on July 24, his fifty-sixth birthday. Members of the National Association acted as honorary pallbearers.

Mr. Keenan was born in Rutland, Vt. He had been actively engaged in every branch of the slate industry and the properties under his direction developed into one of the largest operations producing blackboard, structural and roofing slate.

In a glowing tribute to the life of Mr. Keenan, Secretary Hays of the National Association said:

It is a curious working of fate that the man who offered the resolution on April 20, 1922, making the National Slate Association a practical possibility, and who became its first president, should be the first one called to the Great Beyond.

He has been taken from us in the second year of his administration. His sterling qualities as a man, his business integrity, vision, broadmindedness and regard for the square deal were an inspiration and guide in the destinies of the affairs of this association. To know him was to love him; to hold his confidence an honor. He leaned over backward to avoid any indication of taking advantage of the honor bestowed upon him wisely by the leaders in his industry.

He was ever ready to counsel and guide others in the industry. His word once given by pen or verbally was a bond. He was never known to take unfair advantage of any man or to refuse to deliver slate or orders taken at lower levels simply because with an advancing market or larger demand the same slate could be sold at higher prices.

Mr. Keenan was an ideal president because he blended the viewpoint of the two major producing sections of the industry.

The slate industry and community of Bangor sustain a serious loss in the death of Mr. Keenan. He was the type of active, courageous, tactful, forward-looking, constructive citizen we need more of today. To think that but a day ago I saw him almost back to normal health with his alert mind, inspiring new visions of service the association could render the industry and public for the benefit alike of every concern and individual slate man. One could not know him but love the warmth and sparkle of his eyes and appreciate the humor evidenced to his friends.

Concrete Brick Coming into Favor in East

AS an example of how the scarcity of one product will help to create a demand for another the case of concrete brick may be put in evidence. This product has not been popular in the past and, like concrete blocks when first introduced, were slow in creating a market for themselves. But during the last few months large quantities of concrete brick have been put on the market and have found a ready demand because of the scarcity of clay brick. So far they have been used principally on large operations.—Tomkins Brothers *Trade Review*, July 21, 1923.

Incidentally, rock products operators will be interested to know that the New York Trap Rock Co. has a large concrete brick plant under construction at its Peekskill limestone quarry, to make use of hitherto waste screenings. The new Shope brick plant of the Arundel Sand and Gravel Co. at Baltimore is already doing a large business.

Sand, gravel and crushed stone producers near other large construction centers are daily becoming more interested in concrete brick prospects.

George E. Nicholson Made President of New Yosemite Portland Cement Co.

THE president of the new Yosemite Portland Cement Co., which is building a plant at Merced, Calif., will be George E. Nicholson, of Kansas City, Mo., who is president of the National Cement Co. and the Georgia Cement Co., as well as president of the Commercial Trust Co., one of the largest investment banks in the west, according to the Fresno (Calif.) *Republican*.

The vice-president of the company will be C. S. Woody, of San Francisco, who is associated with Mr. Nicholson in the cement business and in investment banking. The secretary will be E. DeLos Magee, attorney of San Francisco.

The board of directors will consist of seven members, including one Fresno man, one from Merced, and one from Modesto.

Construction of the mill will be under the direction of Leigh Hunt, of Kansas City, who has constructed several of the largest cement plants in the country and who has remodeled a score of others.

If there are no unforeseen obstacles, the plant will begin operations early in the spring, possibly March or April. Mr. Hunt will remain in charge of operations during the first month in order to see that everything is working well.

Associated with Mr. Hunt in the plant construction will be W. A. Kraner, of San Francisco, who has constructed some of the large irrigation dams in California.

The limestone quarries of the new company, according to a survey made by Prof. Andrew C. Lawson, head of the department of geology and mineralogy at the University of California, is "exceptionally high class." The clay on the site at Merced also is considered as "unusually high quality." An indication of this is the pottery plant recently started at Merced.

According to a chemical analysis made by the Twining Laboratories of Fresno, the limestone rock is practically free from magnesia.

Work of opening the first quarry, 68 miles from Merced and 11 miles from East Portal, on the Yosemite Valley railroad, already has been started. This quarry, it has been estimated, has a surface capacity of eight million tons, or enough limestone rock to run the mill 40 years. The second largest of four deposits owned by the company has six million tons on the surface, or enough for 30 years' operations.

Power for the new cement plant will be furnished by the San Joaquin Light & Power Corporation, it was announced. The fuel for the kilns will be oil.

The new plant will be a three-kiln mill and will have a daily output of 2000 bbl. It will employ the "wet process."

According to a survey made by organizers of the company, the San Joaquin valley consumes 7000 bbl. of cement a day. This is the only cement company in the San Joaquin valley and with a freight differential of 46 cents, a great advantage is claimed for the new company.

The new cement plant, which will represent an investment of $1,500,000, will be erected on the unit plan so it can be added to when conditions warrant. While cement is the basic material in all construction, the San Joaquin valley is considered an especially good marketing field because of the large number of power company projects, irrigation projects, concrete ditches, underground drainage systems and a great amount of concrete road work and bridges.

Los Angeles Officials Threaten European Competition in Cement

FOR the alleged purpose of breaking any possible local cement combine and to save the city approximately $120,000 in the purchase of cement for the $12,000,000 outfall sewer, the Los Angeles Board of Public Works recently made radical changes in its specifications, according to the Los Angeles *Express*, which continues:

"Under the new specifications inspection of cement can be made at the point of shipment and not in Los Angeles, which is the present practice. It was said that under the revised specifications outside concerns would be able to compete with local interests.

"At present the approximate price of cement is $3.70 a barrel, the board said. For the work now under construction 120,000 bbl. will be needed, to cost almost a half million dollars.

"With the change in the specifications it was estimated that the price of cement will be cut at least $1 a barrel, thus saving the city $120,000.

"Charles H. Treat, president of the board, has made investigations of European cement concerns and these concerns will be invited to bid on the material, laid down by ship in Los Angeles. Cement concerns in other parts of the United States also will be invited to bid on the large cement order."

New Highway Department Personnel in Ohio

GOVERNOR DONAHEY made a clean sweep of the Ohio State Highway Department, July 1, when the term of the state highway commissioner expired.

Louis A. Boulay, a Toledo civil engineer and a veteran of the Spanish-American and World Wars, is the new state highway director. George F. Schlesinger, of Columbus, has been made state highway engineer, and Harry J. Kirk, who has been both a highway engineer and a contractor, also a native of Columbus, is chief engineer of maintenance.

Regarding Mr. Boulay's appointment, *Macadam Service*, published by the Ohio Macadam Association, says in its July issue: "Governor Donahey is rejoicing in the thought that he has been lucky enough to get a man for highway director who will carry out, in spirit and in letter, his campaign promises as a candidate for governor, that he would bring reform in this work and give to the public more miles of good roads for the money invested."

Secretary Sandles is a warm personal friend of the governor, and he ought to know.

New Clinchfield Plant to be Wet Process

WE have received word from F. Guenther, Jr., general manager, that the Clinchfield Portland Cement Corp., Kingsport, Tenn., is working on plans for a 2000-bbl. mill near Macon, Ga., as announced in ROCK PRODUCTS of July 14. However, the plans have not sufficiently developed to let contracts for construction.

The new plant will be a wet-process plant, employing all the latest types of machinery and equipment. The designing and construction of the plant are in charge of Mr. Guenther, who has had charge of operation of the Kingsport plant for a number of years.

Trinity Cement Co. to Build New Plant at Ft. Worth

THE Trinity Portland Cement Co., Dallas, Texas, has acquired 600 acres near Fort Worth, Texas, as a site for new works. Plans for the initial unit will be prepared at once to have a capacity of 2500 bbl. per 24 hr. It is estimated to cost $750,000, including power house and other departments. Offices will be established at Fort Worth to handle the project and it is purposed to have the mill ready for operation within 12 months. H. L. McCourtie is president, and C. D. E. Ulrickson, vice-president and general manager.

The Southwestern Portland Cement Co. of Los Angeles, Calif., and El Paso, Texas, is also building a plant at Fort Worth.

"Ceramic Industry" Makes Its Bow

THIS magazine, in announcing its first issue, says that "Any man with vision and who has the industry's welfare at heart appreciates that a trade paper, properly edited and supported, can be a valuable influence in inspiring an industry to further efforts. A business publication, to be a genuine success, must subscribe to the proper ideals—and these ideals must include direct interest in aiding the industry in the solution of these problems."

This is truth nailed to the mast. ROCK PRODUCTS wishes *Ceramic Industry* the best of success in its endeavor to become a magazine of wide usefulness in its field, and that it gets the united support of all connected with that industry. The advisory board includes many well-known representatives of manufacturers and producers, and the editors are skilled men.

Rock Products Literature

At last the editors feel justified in establishing a regular department of ROCK PRODUCTS *for notices and reviews of rock products literature; for at last we are beginning to have a literature of the industry.*

The geological surveys of the various states, and of other countries, universities doing experimental work in rock products, and publishers of books relating to the manufacture, handling and merchandising of cement, lime, gypsum, sand, gravel, crushed stone, phosphate rock, talc, slate, and all other non-metallic minerals other than coal, petroleum and clay, are invited to send their publications for notice and review in these columns.

Unless signed, all such notices and reviews are by the editorial staff of ROCK PRODUCTS. *However, it is the intention of the editors to call on such well-known experts as Edmund Shaw, Dr. Oliver Bowles, Raymond Ladoo, and others, to review books in their especial fields.—The Editors.*

Publications Received

THE LIMESTONE AND PHOSPHATE RESOURCES OF NEW ZEALAND (considered principally in relation to agriculture). Part I—Limestone. By P. G. Morgan. Published by the New Zealand Geological Survey (Bulletin No. 22), Wellington, N. Z.; 8½x11; 316 pp. illus., atlas.

BULLETIN OF THE NATIONAL RESEARCH COUNCIL. Proceedings of the second annual meeting of the Advisory Board on Highway Research, Division of Engineering. Edited by William Kendrick Hatt, director, Advisory Board. Published by the National Research Council of the National Academy of Sciences, Washington, D. C.; 6¾x9¾; 89 pp.

MICA DEPOSITS OF ALABAMA. By George Hunting Clark. Published by the Geological Survey of Alabama (Bulletin 24), University of Alabama; 6x9; 116 pp., illus.

A SYMBOL OF SAFETY. An interpretative study of a notable institution organized for service—not profit. By Harry Chase Brearley. Published by Doubleday Page & Co., New York City; 6½x9¼; 290 pp., illus. (Will be reviewed in a later issue.)

CONCRETE DATA FOR ENGINEERS AND ARCHITECTS. Important factors in making good concrete. Published by the Portland Cement Association; 8½x11; 16 pp., illus.

TRUCK OPERATING COSTS. By Ben H. Petty. Bulletin 10, Engineering Experiment Station, Lafayette University, Lafayette, Ind.; 6x9; 46 pp., illus.

INTERIM REPORT OF THE DOMINION FUEL BOARD, 1923. Ottawa, Canada; 6x9; 32 pp., illus; maps.

EXPOSIVES—THEIR MATERIALS, CONSTITUTION AND ANALYSIS. By C. A. Taylor and William H. Rinkenbach. Bulletin 219, Department of the Interior, Bureau of Mines, Washington, D. C. 6x9; 188 pp.; illus.

THE OCCURRENCE AND USES OF PEAT IN THE UNITED STATES. By E. K. Soper and C. C. Osborn. Bulletin 728, Department of the Interior, U. S. Geological Survey; 6x9; 208 pp.; maps. Price 50 cents.

YEAR BOOK OF THE AMERICAN ENGINEERING STANDARDS COMMITTEE 1923. Published by the American Engineering Standards Committee, 29 West 39th street, New York City; 8x10½; 48 pp.

MINERALS OF CALIFORNIA. By Arthur S. Eakle, Ph.D. Bulletin 91, California State Mining Bureau, Ferry Building, San Francisco, Calif.; 6½x9¾; 328 pp.

UNDERGROUND VENTILATION AT BUTTE. By Daniel Harrington. Bulletin 204, Department of the Interior, Bureau of Mines, Washington, D. C.; 6x9; 132 pp.; illus. Price 25 cents.

CONVENTION PROCEEDINGS, 1923, OF THE AMERICAN ROAD BUILDERS' ASSOCIATION. With supplements consisting of revised constitution and a list of exhibitors at the Fourteenth National Good Roads Show. Edited by Robert K. Tomlin, Jr. Published by the American Road Builders' Association, 37 West 39th street, New York City; 6x9; 228 pp.; illus. Price $3.

FERTILIZER REGISTRATIONS. Neil E. Gordon, State Chemist; Leslie E. Bopst, in charge of Fertilizer Department. State Fertilizer Department, University of Maryland, College Park, Md.; 6x9; 30 pp.

REPORT OF THE AMERICAN RAILWAY ASSOCIATION CONFERENCE COMMITTEE WITH THE UNITED STATES COAL COMMISSION. Published by the American Railway Association, New York City; 8½x11½; 104 pp.; illus.

Books Reviewed

PIT AND QUARRY HANDBOOK. For sand, gravel, stone, cement, gypsum and lime industries. Published by the Complete Service Publishing Co., Chicago, Ill.; 6x9; 332 pp., illus. Price $5. Free to operators.

THIS is a handbook of helpful information designed for the use of producers of sand, gravel, crushed stone, portland cement, talc, soapstone, feldspar, lime, gypsum, phosphate rock and silica. In addition to containing summaries on the production methods of these materials, obviously based on previously published information in the U. S. Geological Survey Reports and various periodicals, there are reprints of the Car Demurrage Rules of the Interstate Commerce Commission; statistics of production; a glossary of terms; the safety orders of the Wisconsin Industrial Commission in its code for quarries; a directory of associations, and other material.

This handbook brings together in convenient form a great deal of information heretofore scattered in many pamphlets and publications. However, its value to the technical reader would be much greater if the source and authority for the data were given.

About half the book consists of advertisements of machinery, equipment and materials used or consumed in the industries described.

SOIL FERTILITY AND FERTILIZERS. By James Edward Halligan, chemist in charge, Louisiana State Experiment Station. Published by the Chemical Publishing Co., Easton, Pa.; 6¼x9; 398 pp.; illus. Price $——.

PRODUCERS of agricultural lime and limestone, rock phosphate and other minerals used in agriculture require some knowledge of soils and fertilizers in order to market their materials intelligently; especially if they are selling the farmer direct. This book is an elementary treatise of the subject especially designed for the use of manufacturers. Technical terms are omitted so far as possible.

The subjects covered include: Chemical elements needed by plants and the composition of plants; the fertility of the soil; maintaining soil fertility; farm manures; high grade nitrogenous materials; low grade nitrogenous materials and the functions of nitrogen; phosphates; superphosphates and the effect of phosphoric acid; potash fertilizers; miscellaneous fertilizer materials, including such things as lime kiln ashes, feldspathic rock; commercial fertilizers; lime, gypsum and green manures; valuation of fertilizers; high, medium and low grade fertilizers; home mixtures; fertilizer formulas for crops.

THE KEYSTONE CATALOG 1922—METAL AND QUARRY EDITION. A consolidation of condensed catalog information pertaining to the metallic and non-metallic mining industries, quarries and cement mills; together with engineering data covering various operations pertaining thereto. Devised, compiled, edited and published by the Keystone Consolidated Publishing Co., Inc., Pittsburgh, Pa.; 10x12½; 832 pp., illus. Price $10. Free to operators.

HERE is a co-operative catalog for machinery and equipment manufacturers serving the mining industries, which include, of course, the production of sand, gravel, crushed stone and other rock products. It is by far the most complete and comprehensive publication of its kind—having more than 300 advertisers. In addition to an index of advertisers, there is a comprehensive "products" index.

The material in the book is segregated into 24 sections under the following titles: (1) engineering, prospecting and exploration; (2) building materials, mine timbering and supports; (3) power plant and compressed air; (4) power transmission; (5) electrical machinery and supplies; (6) drilling and underground loading; (7) haulage; (8) hoisting; (9) drainage and pumping; (10) ventilation; (11) mine lighting; (12) open cut and quarry; (13) aerial tramways and cableways; (14) placer, hydraulic and dredging; (15) lubrication; (16) explosions and blasting; (17) ore dressing and milling; (18) cyanidation and hydrometallurgy; (19) smelting, refining and metallurgy; (20) flotation and chemicals; (21) assaying and laboratory; (22) safety, sanitation and welfare; (23) general machinery shop and repair; (24) mine and mill supplies.

Each section is preceded by several pages of editorial matter—data, tables and information—on the general subject of that section. Quotations from technical and trade papers, government reports, etc., are credited to their source, so that the reader may know their authenticity and follow the subject further, if he so desires.

Questions and Answers

Edmund Shaw, Consulting Engineer, Chicago, Ill., Expert on Problems of Screening, Washing and Hydraulic Separation

THE TECHNICAL STAFF OF ROCK PRODUCTS

Edwin Brooker, Washington, D. C., Consulting Expert on Matters of Transportation and Freight Rates

No. 74. **Agricultural Lime or Limestone?**—There seems to be a confusion in the meaning and use of the terms "agricultural lime" and limestone. Have producers of agricultural limestone the right to refer to their product as "agricultural lime?"—L. L. C.

A. There have been many controversies on this subject and I believe in some Eastern states the agricultural experiment stations have practically forbidden the use of the term "agricultural lime" when limestone was the material referred to. However, almost all literature on soils and fertilizers uses the term lime to cover the three materials known under their chemical names as carbonate of lime, oxide of lime and hydrate of lime. Carbonate of lime is, of course, merely another name for limestone, so there is much justification for the term "agricultural lime" when ground limestone is meant. However, in our own use of the terms we try to avoid the use of the word "lime" except as it refers to oxide of lime, or calcium oxide or burned lime—CaO. For the sake of clearness and brevity we have adopted the term "agstone," coined by our good friend A. P. Sandles, secretary of the National Agricultural Limestone Association, to describe agricultural ground limestone. We suggest that contributors and readers make the same distinction.—N. C. R.

No. 75. **What Is Your Editorial Policy?**—In reading a recent article describing a sand and gravel plant we notice you mention that this plant uses an American derrick, an American electric hoist, McCully gyratory crushers, Worthington pan conveyors, Worthington screens, Hummer screens, Stephens-Adamson settling tanks, a Morris centrifugal pump, McMyler traveling electric crane and a Hayward orange-peel bucket. Inasmuch as wire rope is an important part of a plant of this kind we feel that you should have mentioned that by name. What is your editorial policy in this regard?—G. H. L.

A. We are glad of an opportunity to explain to our readers just what our policy is in regard to mentioning equipment and machinery by name in our plant descriptions. The editors have done their best to find out from actual operators just what information was wanted in such plant descriptions; and in nearly every case operators do want to know just what the equipment is. Knowing this, an experienced operator can form some estimate of the investment involved and check his own purchasing judgment with that of other operators. Moreover, it is impossible to describe many pieces of equipment, such for instance as a Schaffer poidometer, a Hum-mer screen, a Raymond mill, etc., without giving the trade name or the manufacturer's name.

Of course, this can be interpreted as advertising, and indeed the U. S. Post Office Department did attempt for some time to so classify reading pages containing the names of manufacturers. But it was shown to the authorities that in the last analysis all mention of any one or anything in print was advertising or publicity, and that it was impossible to draw a fine line in such cases, and the attempt to enforce this rule in the matter of plant descriptions has since been abandoned.

For example, a consulting engineer contributes an article which adds authoritative and valuable literature to the industry. He is paid for the article and the addition of his name to it increases its value and authenticity. Nevertheless this is, in the last analysis, good advertising or publicity for him; and the editors and the readers as well are glad to have him get it. It is inseparable from the publishing business.

ALL inquiries are confidential. We answer them at once by letter. Those of general interest afterward appear on this page. Readers are invited to send inquiries and we welcome corrections in published answers. We do the best we can, but we know readers with wider experience can give more adequate or accurate answers to many of these. This is your page. Use it.—The Editors.

Likewise, every mention of President Harding in the newspapers or of Senator-Elect Magnus Johnson of Minnesota, is valuable advertising for them if they have further political ambitions. Newspaper editors know it, although promoting those ambitions may be far from their object; but it is all news and the readers want it.

On the other hand, the thing can be abused, and often is abused. Much so-called literature is gotten up and propagated for the sole purpose of giving publicity to some manufacturer or some piece of marketable equipment. Indeed whole magazines, so called, are broadcasted for this purpose alone.

In the case of Rock Products and other reputable journals which belong to the Associated Business Papers, Inc., and subscribe to its code of principles, the editors endeavor always to keep in mind the interest and desires of their readers, first, foremost and all the time. For example, we have learned that there are great differences in the design and construction of various makes of crushers, steam shovels, well drills, cranes, etc., as well as differences in price, and a description to be complete should give all the information that the reader requires.

We do not, as some journals do, confine mention of equipment by name to advertisers in our paper. That factor is not considered at all. The sole question is this: Is it necessary to an adequate description to mention the equipment by name? There are instances where the kind of wire rope used may be a very important consideration; and there may be other instances where brevity and wit both require its not being mentioned—being under some circumstances a very minor part of the equipment. In these cases the editor's judgment is guided solely by what he believes the reader wants to know.

Now this is a matter of common controversy between advertisers and editors and our readers can be of very material help to us in making us better editors by telling us frankly and pointedly just what they do want in the matter of details in plant descriptions.—N. C. R.

No. 76. **What Is the Status of the American Byproduct Potash Industry?** A reader wishes to know what has happened to the potash-recovery plants at portland cement works since the war.—E. A. H.

A. So far as we can find out, only one American portland cement plant is now manufacturing and marketing an acceptable potash salt. This is the Santa Cruz Portland Cement Co., whose potash-recovery plant was described in Rock Products of August 28, 1920, page 17. This company was perhaps the only one which carried its experiment with the Cottrell electrical precipitation process to its logical conclusion to obtain by simple, direct methods a merchantable potassium sulplate. Since the World War and the renewal of imports from Alsace-Lorraine, the American portland cement manufacturers have been unable to compete, both on quality of product and price. The reasons for this may be temporary—because of unusually favorable foreign exchange, the heavy depression of the fertilizer industry, and the great demand for all the cement that can be produced without bothering with byproducts. So far as we know, none of these potash recovery plants has been dismantled; and the time may come again in the near future when experiments with them will be taken up and carried to conclusion.—N. C. R.

Quarrying and Crushing Granite in South Carolina

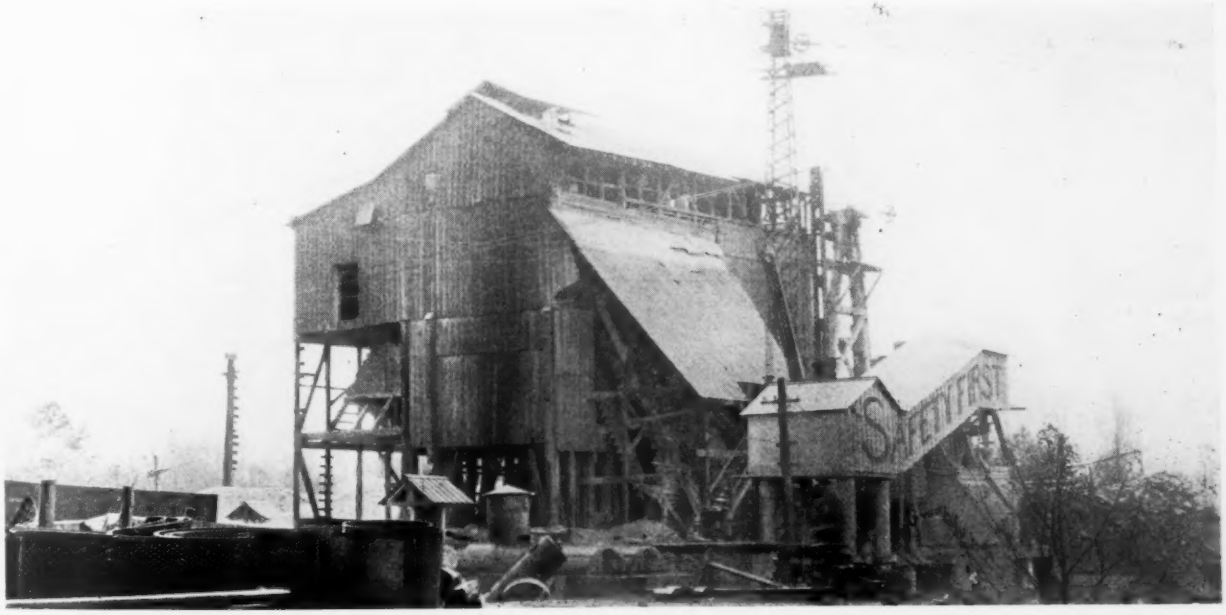
The Weston & Brooker Co. Operation at Cayce, S. C., Is One of the Largest and Best Equipped in the United States. The Granite Is of Fine Quality and the Production Methods Unusual

THE Weston & Brooker Co. at Cayce, S. C., possibly employs more unique and distinctive methods in the operation of its granite quarries and crushing plant than can be found at any other operation of its kind. Operating in two 9-hr. shifts of 130 men each, the company produces 2000 tons daily of riprap and crushed granite for commercial purposes.

The quarries and plant are near Cayce, which is on the opposite side of the Congaree river from Columbia in Lexington county. The plant is served directly by the Seaboard Airline railroad and is within the switching district of both the Southern and Atlantic Coast Line railways. According to the company officials, deliveries are made in the territory within the triangle formed by the three points, Columbia, S. C., Wilmington, N. C. and Jacksonville, Fla. In addition to this territory, the company controls an area for 50 miles west and southwest. The territory mentioned is also shared by the Palmetto Quarries Co., of Columbia, and is depended upon for all-year business. Both companies receive considerable business from the territory north and northwest when their Northern competitors cannot fill the demand.

The quarry instead of being square or oblong is V-shaped; that is, there are two rectangular pits, one 200x865 ft., 212 ft. deep, and the other 100x750 ft., 100 ft. deep These pits running together form a V, and at the point of the V, on the surface level, is the crushing and screening plant. As the average elevation of the company's property is but 35 ft. above normal water level, the quarry floor therefore is 177 ft. below the bed of the river adjoining the property. It is also interesting to note that this floor is approximately 100 ft. below sea level.

Drilling is done by two well drills—a Keystone and a Loomis; three model F-24 Ingersoll-Rand tripods; two model BCR-430 and 10 model DCR-13 Ingersoll-Rand Jackhamers. Air is furnished to this equipment by an Imperial Type 10 Ingersoll-Rand compressor, driven by 150-hp. motor and a second compressor—a Worthington 20x12x16 duplex, two-stage, feather-value, direct connected, driven by a 250-hp. Ideal synchronous motor—is being installed so that an auxiliary unit will be available at all times.



Crushing and screening plant. Skips coming in on the two cableways dump in a crusher at the opposite end of the building having the sign, "Safety First"

Both of the pits are worked by hand. Skips made of ¾-in. boiler plate, 10 ft. long by 7 ft. wide and 24 in. deep, are placed flat on the quarry floor, with their open end toward the stone to be loaded. They are loaded by barring and rolling the larger sizes and by hand-loading the smaller sizes. The capacity of these skips is 6½ tons.

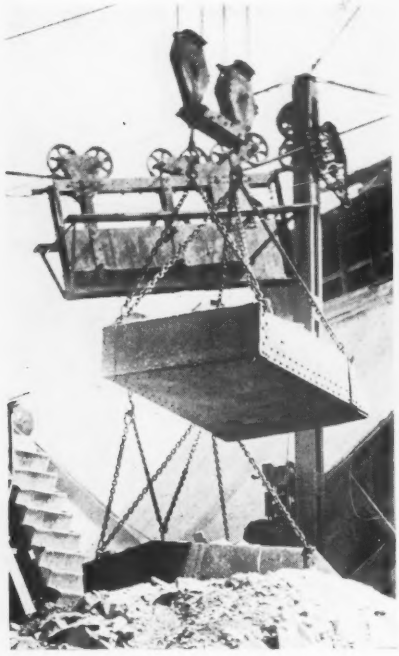
Each quarry, or pit, is equipped with a traveling cableway. For the purpose of distinguishing them locally, the deepest pit operation is known as Cableway No. 1 and the other as No. 2. Both cableways come in at the same point at the plant but each has an individual tail tower. The tallest of the two towers is 67 ft. high and is of heavy steel construction.

General view of the Weston & Brooker Co. quarry, S. C., shou

Cableway No. 1 comprises a 75-ft. steel tower mounted on a car of steel construction having two trucks which run on two standard-gage tracks spaced 30 ft. apart. The radial movement is obtained by the use of a worm-driven drum powered by a reversible motor which pulls in either direction on wire rope extended to ground anchorage. The equipment of the tower was furnished by the Lambert Hoisting Engine Co. and is powered by a 90-hp. motor with variable speed control.

Cableway No. 2 is of special construction and is entirely of steel and concrete. Instead of traveling on two sets of standard-gage track, it is mounted on one truck of 8½ ft. gage. The inner rail of the track upon which this cableway travels is elevated 15 in. so that the center of gravity is thrown behind the inside rail. Transverse motion is obtained by a direct-connected 20-hp. motor which drives a Fawcus worm gear operating on one pair of the truck wheels. The use of the Fawcus herringbone gears and two 75-hp. motors eliminates the necessity of friction clutches. This tower travels over 150 ft. of track.

Both cableways are provided with 2¼-in. track cables, each of 6-strand, 19-wire construction. The conveying and load lines are ¾ in. and are of the same construction as the track lines. The cableway track cables were furnished by the A. Leschen & Sons Rope Co. and the conveying and load lines by John A. Roebling's



A close view showing both cableways with skips at the crusher. Note the carrier construction of the lower cableway

This 40-in. elevator handles the entire product of the big crusher and empties it in the second crusher

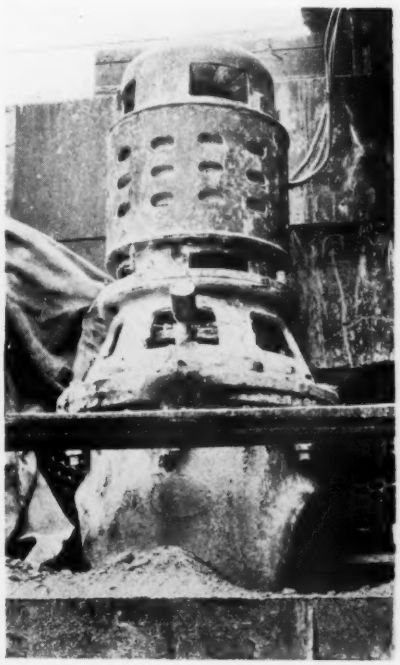
The No. 27 primary crusher is outside the plant proper. Note the natural hopper formed by piled stone

...Co. quarry, S. C., showing both pits. Note the comparative depths

Sons Co. All carriers, sheaves and pulleys are of the company's own design.

A novel feature is embodied at the dumping-point of the skips. Here a sign is mounted on a post in such a way that it will revolve. On one side is reads "Hold" and on the other side "Dump." This sign is located so that it can be seen by the operators of both towers across the pits. Whenever the primary crusher is choked or anything is wrong at the plant, the "hold" side is turned toward the towers. When ready to resume, the crusher feeder turns the opposite side outward and the tower operator releases the skip.

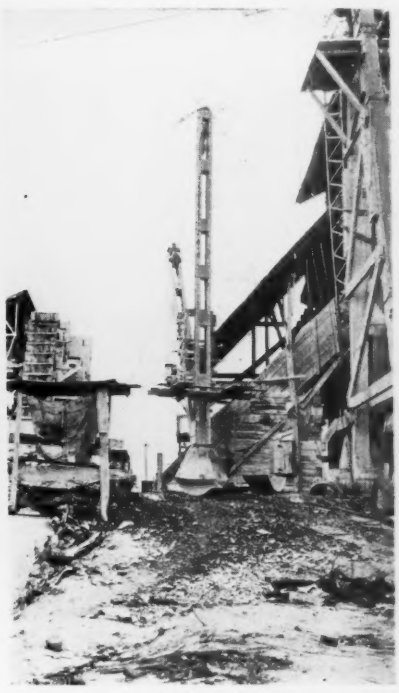
Loaded cars are switched by an electrically powered hoist mounted at the end of the middle track. The track leads to the riprap loading point



This crusher recrushes all the material discharged from the initial breaker

At this point there is also erected a 50-ton capacity steel derrick which is fitted with a 40-ft. mast and a 27-ft. boom. It is operated by a National Hoisting Co. two-drum air hoist mounted on the mast. This derrick can reach over any of the four crushers and is invaluable whenever repairs are necessary on any of the machines. It also comes in handy on many occasions in removing "life-size" boulders that have choked up the primary crusher.

The primary crusher is a No. 27 Kennedy gyratory and is outside the plant proper, with no shelter, so that skips may



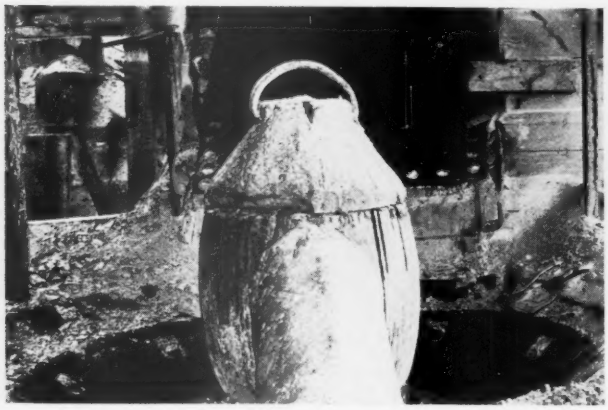
This all-steel derrick is used for removing heavy crusher parts when repairs are necessary. It can reach all of the crushers

be dumped directly into it. All of the product of this crusher is elevated in a 40-in. by 30-ft. belt bucket elevator and emptied in a chute feeding a No. 36-A Weston direct-drive gyratory crusher, driven by a 75-hp. motor. This is the first crusher of this make installed and the operators say that since its installation in August, 1921, it has crushed more than 300,000 tons of screen is chuted into the boot of a 30-in. belt bucket conveyor of 77-ft. centers leading to the sizing screens. The rejections from the flat manganese screen flow direct to a No. 8 Kennedy crusher which in turn discharges into the same elevator handling the product of the flat screen.

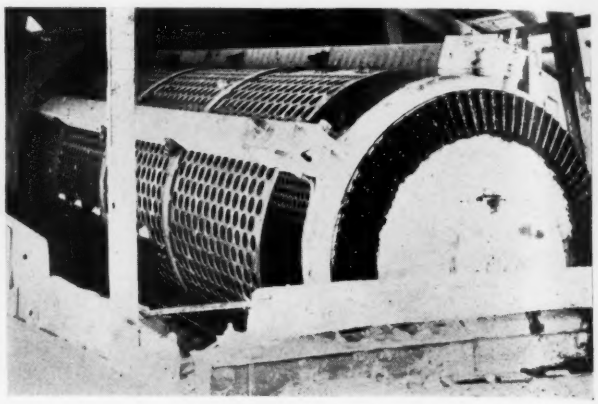
This bucket elevator is fitted with special buckets manufactured by the Hendricks Mfg. Co. and is driven by a 40-hp. motor. It discharges into an Austin revolving screen, 60 in. in diameter by 24 ft. long, with a 78-in. by 12-ft. outer jacket of ¾-in. perforations. The inner barrel of this screen is fitted with three 4-ft. sections of 1⅜-in. perforation; one section of 2¼-in., and two sections of 2¾-in. perforations. The rejections from this screen are moved by gravity to a No. 5 Kennedy gyratory, the product of which is returned to the sizing screens in the main elevator.

All material passing through the ¾-in. outer jacket of the sizing screen is chuted to a 24-in. belt conveyor, 22 ft. long, which carries it to a 48-in. by 20-ft. Kennedy revolving screen of ¼-in. perforations throughout. This screen, of course, is intended only to remove the dust. Everything between ¼ and ¾ in. is binned together.

Railway sidings provide accommodations for 30 cars above the plant and 16 below. As the railroad company gives three removal switches per day, this space is adequate for the operation's requirements. Cars may be loaded on three



The 60x60-in. section of screen behind this crusher removes all the stone under 2¾ in. This is the second secondary breaker



This 60-in. by 24-ft. screen is equipped with a 78-in. by 12-ft. outer jacket of ¾-in. perforations and handles the entire production

Loading skips. The use of steam shovels for loading is considered impracticable as compared to the hand-loading method. President Weston is standing in the left-hand background

One of the all-steel traveling towers. The standard-gage tracks on which it travels are 30 ft. apart

granite and that no repairs have been necessary. The Weston direct-drive crusher is now being manufactured and installed in other plants throughout the country.

This machine is set to discharge at 2½ in. and the chute leading from it is fitted with a 60x60-in. flat manganese steel screen, 1 in. thick, with 2¾-in. perforations. The material passing through this

This shows a skip being lifted from one of the pits. The tower runs over 150 ft. of track so that it can reach any point in the pit

This is a reproduction of a remarkable photograph taken during a shot. Six tons of dynamite in this single blast brought down 65,000 tons of granite

These machines keep loose stone ahead. Note the deposit's formation

tracks: one running directly under the bins, one on the outside, and one between the plant and quarry, for loading riprap. The necessary shifting in loading cars is handled by an electrically powered hoisting engine mounted at the end of the center loading track.

The officers of the company are: T. I. Weston, president and treasurer; B. O. Brooker, vice-president, secretary and assistant treasurer, and W. S. Weston, vice-president.

Distributing Methods of Portland Cement Manufacturers Criticised

A PROMINENT northwestern building supply dealer, who does not wish his name disclosed here, writes the editor as follows:

"The writer read with deep interest your article, 'Cement Manufacturers Ask More Uniform Distribution of Product,' in the June 30 issue of ROCK PRODUCTS.

"Personally I have no sympathy for the cement manufacturers, as the prevailing conditions were brought about through the efforts of the cement manufacturers themselves, who left no stone unturned in establishing the so-called zone rates, thereby eliminating the sale of cement through jobbers in the large centers to retail dealers in the smaller towns.

"The good book says, 'As ye sow, so shall ye reap," and this, I think, applies to the cement manufacturers in their present predicament as regards the storage of cement during the closed season. One would scarcely expect a customer, who perhaps handles a car or two of cement during the season, to apply to the corner drug store, or grocery, but he would naturally go to his nearest large city, where he would expect to find the market for cement, as well as he would find hardware, paint, or any other material used in construction.

"If the cement manufacturers sincerely wish to be relieved of their storage trouble and really want a more uniform distribution of their product, let them go to the Interstate Commerce Commission and confess they were wrong in zoning the cement rates, and apply for relief by reinstating the system of cement rates as they were in 1916."

E. L. Sanborn Promoted

E. L. SANBORN, formerly manager of the Chicago sales office of the Power and Mining division of the Worthington Pump and Machinery Corp., is now assistant to the works sales manager, H. N. Bond, at Cudahy, Wis. In his new office Mr. Sanborn is in charge of the sales department of the cement, crushing and creosoting branches of the corporation.

George W. Shores, formerly of the New York City office, succeeds Mr. Sanborn at Chicago.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning July 23:

Central Freight Association

6766. Crushed Stone and Crushed Stone Screenings, Bluffton, Ind., to Indiana as maximum; per net ton:

To	Present	Proposed
Dunfee	$0.97	$0.80
Raber	.97	.80
Peabody	1.07	.43
South Whitley	1.07	.80
Sidney	1.07	.92
Packertown	1.07	.92
Claypool	1.17	.97
Burket	1.17	.97
Mentone	1.17	1.00
Tippecanoe	1.27	1.00
Argos	1.27	1.00
Rutland	1.27	1.00
Hibbard	1.27	1.00
Burr Oak	1.27	1.00
Ober	1.27	1.00
Knox	1.38	1.05

6767. Sand and Gravel, Peru, Ind., to Muncie, Ind., and intermediate points; Richmond, Ind., and intermediate stations south of Muncie. Present, 6th class rates. Proposed, (a) 60 cents per net ton, (b) 70 cents.

6794. Sand and Gravel, West Pittsburgh, Pa., to Kaylor, Dewey and Brady's Bend, Pa., present 13 cents; proposed, $1.01 per net ton on sand, blast, engine, foundry, glass molding or silica sands; 90 cents per net ton on other kinds.

6795. Cement, Portland, Universal, Pa., and East New Castle, Pa., to stations on Southern New York Power & Ry. Corp. Present, 20½ cents from Universal, Pa., to Richfield Springs, N. Y. plus local rates beyond. Proposed:

To	From East New Castle	From Universal
Mohawk	$0.25½	$0.24½
Henderson	.25½	.24½
Jordanville	.24	.23
Schuyler Lake	.23½	.22½
Oaksville	.23½	.22½
To		
Laurens	.25½	.24½
West Oneonta	.26½	.25½
Oneonta	.26½	.25½

6796. Core Sand, Lake Ciecott, Ind., to Illinois, Missouri and Michigan, present and proposed:

To	Present	Proposed per net ton
Benton Harbor, Mich.	$0.17	$1.39
Danville, Ill.	.14½	1.39
Hoopeston, Ill.	.14½	1.54
Springfield, Ill.	.20½	2.02
Bloomington, Ill.	.18	1.76
St. Louis, Mo.	.22	2.14

6797. Sand and Gravel, (A) Jamestown, Pa., (B) Polk and Raymilton, Pa., to (A) Ohio and Pennsylvania., (B) L. E. F. & C. points. Illustrations (per net ton), proposed:

To Ashtabula, O., $0.90; Burton, O., $1.25; Clairton, Pa., $1.60; Cranesville, Pa., $0.90. Elyria, O., $1.40; Geneva, O., $1.05; *Irvineton, Pa., $1.40; Lockwood, O., $1.25; Niles, O., $1.05; Oneida, Pa., $1.15; Russell, Pa., $1.75; Shippenville, Pa., $1.15; Springboro, Pa., $0.90; Tryonville, Pa., $1.25; Wampum, Pa., $1.05; Willoughby, O., $1.15.

*Will not apply via N. Y. C. direct.

(b) $2.14 on blast, engine, foundry, glass, molding or silica sand; $1.95 on other grades.

Proposed—$1.76 on higher grades of sand and $1.60 per net ton on lower grades.

Proposed—To establish in connection with rates on sand and gravel from Jamestown, Pa., minimum weight of 90 per cent of marked capacity of car except when car is loaded to full cubical or visible capacity, actual weight will apply.

6798. Crushed Stone and Screenings, Buffalo, N. Y., to Linesville, Pa. Present, 17 cents; proposed, $1.76 per net ton.

6826. Crushed Stone, North Baltimore, O., to Detroit, Mich. Present, $1.32 per net ton; proposed, $1.14.

6827. Slag, Chicago, Ill., to Indiana (per net ton):

To	Present	Proposed
Wheeler	$1.01	$0.80
Valpraiso	1.01	.90
Montdale	1.01	.90
Wanatah	1.01	.90
Hanna	1.01	.90
Bee Grove	1.01	.90
Davis	1.01	.90
Hamlet	1.01	.90
Groverstown	1.25	1.00
Donaldson	1.26	1.00
Plymouth	1.26	1.10
Inwood	1.39	1.27
Bourbon	1.39	1.27
Etna Green	1.64	1.38
Atwood	1.64	1.38
Warsak	1.64	1.38
Winona Lake	1.64	1.38
Piercetон	1.64	1.38
Larwill	1.64	1.38
Columbia City	1.64	1.38
Coesse	1.64	1.38
Arcola	1.64	1.38
Ft. Wayne	1.64	1.38

6830. Lime, Milltown and Marengo, Ind., to Henderson, Ky. Present, 17 cents; proposed, 13 cents, minimum weight 30,000 lb.

6793. Sand and Gravel, Beesons, Ind., to Indiana, per net ton:

To	Present	Proposed
Ft. Wayne	$0.99	$0.88
Hugo	.99	.88
Ferguson	.99	.88
Yoder	.99	.88
Ossian	.99	.88
Kingsland	.99	.88
Bluffton	.99	.88
Poneto	.99	.88
Keystone	.67	.88
Montpelier	.99	.88
Mollies	.99	.88
DeSota	.88	.76
Albany	.88	.76
Red Key	.88	.76
Blaine	.99	.88
Portland	.99	.88
Brice	.99	.88

6849. Sand (except loam sand) and Gravel, West Ellwood Junction, Pa., to Ellwood City, Pa. Present, 70 cents per net ton; proposed, 60 cents per net ton.

Illinois Freight Association

1906. Sand and Gravel, Crushed Stone, carloads, minimum weight capacity of car, $1 per net ton on sand and gravel and $1.13 on crushed stone from Hillside, Ill., to Madison, Monroe, Monticello, and Dill, Wis.

1907. Sand and Gravel, carloads, minimum weight capacity of car, 80 cents per net ton from Forreston, Ill., to Madison and Dill, Wis.

1912. Sand and Gravel, carloads, minimum weight capacity of car, 88 cents per net ton from Lincoln to Millersville, Owaneco and Velma, Ill., on the B. & O.

1913. Sand and Gravel, carloads, minimum weight capacity of car, $1.13 per net ton from Lincoln, Ill., to Chrisman, $1 to Metcalf, Hume, McCowen, Newman and Murdock, 88 cents to Camargo, Ficklin, Garrett, Attwood, Pierson, Hammond, Burrowsville, Lintner, LaPlace, Casner and Long Creek, etc.

1923. Crushed Stone, carloads, minimum weight capacity of car, $1.20 per net ton from Rosiview and Shetlerville, to Choat, Ill. (M. R. P. 213).

1924. Sand and Gravel, carloads, minimum weight 90 per cent of marked capacity of car, except when car is loaded to full visible capacity or cubical capacity, actual weight to apply; $1.10 per net ton from Cowling, Ill., to stations on the Southern Ry. west of Mt. Carmel, Ill., viz: Belmont, Brown, and Algion, Ill., and $1.26 to Ellery, Golden Gate, Merriam and Fairfield, Ill.

1925. Sand and Gravel, carloads, minimum weight 90 per cent of marked capacity of car, 88 cents per net ton from Cowling, Ill., to stations on C. C. C. & St. L., viz: Brownsville, Norris City, Gossett, Texas City, Eldorado, Muddy, Harrisburg, Ledford, and $1.13 to Carrier Mills, Stonefort, New Burnside, Parker, Tunnel Hill, Bloomfield and Vienna, Ill.

1926. Molding Sand, carloads, minimum weight 90 per cent of marked capacity of car, $1.30 per net ton from Tamalco and Arenzville to Decatur and $1.50 to Bloomington, Ill.

1927. Gravel, carloads, minimum weight 90 per cent of marked capacity of car, 88 cents per net ton from Cairo to Eldorado, Ill. (M. P. R. 218).

1933. Lime, carloads, minimum weight 50,000 lb., 7 cents per 100 lb., from Alton, Ill., to Hannibal, Mo. (M. R. P. 215).

1936. Crushed Stone, carloads, 68 cents per net ton from Rockford to Chicago, Ill., for I. C. delivery.

1945. Cement, carloads, minimum weight, 50,000 lb., 8 cents per 100 lb., from Dixon, LaSalle and Oglesby, to all stations on the Chicago, Aurora & Elgin, viz: Aurora, Batavia, Elmhurst, Forest Park, etc.

1946. Lime Phosphate, carloads, minimum weight 40,000 lb., 26 cents per 100 lb., from Hoopeston, to Cairo, Ill.

1947. Sand and Gravel, carloads, minimum weight 90 per cent of marked capacity of car, from Blackhawk, Ill., to points of destination on C. R. I. & P., in I. R. C. territory on basis of 10 cents per ton higher than rates from Milan, Ill., to same destinations, e. g., $1.09 per net ton to Alta, 98 cents to Annawan, $1.11 to Chillicothe, $1.09 to Peoria, Ill., etc.

1959. Cement, carloads, 19½ cents per 100 lb., from Dixon, LaSalle and Oglesby, Ill., 17 cents from Buffington, Ind., and 19 cents from Hannibal, Mo., to Newburgh, Ind.

1976. Sand, carloads, minimum weight, 90 per cent of marked capacity of car, $1.13 from Gary, Ind., Pontiac, Streator, and Gibson City, $1.39 to Decatur, Springfield, Danville and Champaign, $1.51 to Jacksonville, Taylorville, Litchfield, and Edwardsville, $1.77 to Quincy, Ill., and St. Louis, Mo., and $1.64 per net ton to East St. Louis, Ill., and for one line haul via Wabash railroad.

1990. Molding Sand, carloads, minimum weight marked capacity of car, 65 cents per net ton from Wilmington to Chicago, Ill., terminal switching charges at Chicago to be in addition.

1991. Sand, carloads, minimum weight marked capacity of car, $1.13 per net ton from Alton to Lincoln, Greggs and Boardwell, Ill., on C. & A.

New England Freight Association

4899. Lime, minimum weight 40,000 lb., Cheshire, Dalton, Farnams, North Adams, Renfrew, Richmond, Zylonite, Mass., to Allendale, Mahwah, Ramsey, N. J., Suffern, N. Y., 20½, Arden, Central Valley, Oxford, Southfields, Tuxedo, N. Y., 17. Reason—Same rates as to points in contiguous territory.

4916. Cement, common, hydraulic, natural or portland, minimum weight 50,000 lb., except when capacity of car is less, the capacity of car will govern, but not less than 40,000 lb. Hudson Upper, to Broadalbin, Mayfield, $3.40 per net ton; Cranberry Creek, Northville, $3.66 per net ton; Gloversville, $3.15 per net ton, Johnstown, N. Y., $2.90 per net ton. Reason—To restore relationship.

4960. Sand, common (not molding, fire, filter or blast sand), minimum weight 90 per cent of marked capacity of car, except when loaded to cubical or visible capacity, actual weight will apply, North Wilbraham to Millers Falls, Mass., 6½. Reason—To establish commodity rate for new movement comparable to existing rates.

4965. Crushed Stone, minimum weight 90 per cent of marked capacity of car furnished except when car is loaded to cubical or visible capacity actual weight will apply Bethel to Sheldon Springs, Vt., $1.30 per net ton. Reason—Proposed rate comparable with basis generally in effect in New England today.

Southern Freight Association

10520. Sand, in packages or in bulk, carloads minimum weight 50,000 lb., from Pablo Beach, Fla., to St. Louis, Mo. At present Jacksonville combination applies. Proposed rate, $8.17 per ton 2000 lb.

10548. Revision of commodity description on lime, C. L., from Ohio and Mississippi river crossings, Nashville, Tenn., etc., to local and junction points in Georgia, North and South Carolina, Tennesse and Virginia. Present description, as shown in Agent Speiden's I. C. C. 643 reads: "Lime, carload, min. wt. 30,000 lb." Proposed description: "Lime, common, hydrated, quick or slacked, straight or mixed, carload." The proposed change is for the purpose of clarifying the tariff and preventing any possible misunderstanding with respect to the correct application of the commodity rates.

10574. Gravel, Novaculite or Ganister, C. L., from Elco and Gravel Pit, Ill., to Alamo, Bells and Milan, Tenn. Present rate, combination, proposed rate, $1.21 per net ton, same as rate enjoyed at adiacent points.

10580. Cement, C. L., minimum weight 50,000 lb., from Fordwick, Va., to stations on the N. H. & Mt. V. Present and proposed rate per 100 lb. are:

To	Present	Proposed
Higginsport, N. C.	$0.29½	$0.28½
Harrison	.29½	.28½
Benhampton	.30½	.28½
New Holland	.30½	.28½

Proposed rates to Harrison and New Holland made on combination of local rates to and from Norfolk, Va., in connection with Agent Kelley's Combination Tariff, observing same rate to other points named in order to avoid Fourth Section violations.

10587. Slag, C. L., from Birmingham, Ala., district points to Esto, Noma, Wynnlum, Eleanor and Graceville, Fla.; class A rates apply at present. It is proposed to reduce present rates: From Woodward, Ensley, Birmingham and Bessemer, Ala., $1.90; Alabama City, $2.10 per net ton. Proposed rates made same as from other equidistant points on the L. & N.

10589. Sand and Gravel, C. L., from Montgomery and Flomaton, Ala. Present rate, 16 cents per 100 lb. (Class N.); proposed rate, 7 cents per 100 lb., made in line with rates in effect from and to points in the same general territory, distance considered.

10595. Lime, C. L., minimum weight 30,000 lb., from Knoxville, River Front Extension, Marble City, Concord and Luttrell, Tenn., to Kentucky junction points. No specific commodity rates at present published, except to Lexington and Winchester, Ky. The present and proposed rates per net ton are:

To	Present	Proposed
Lexington	$2.59	$3.10
Winchester	2.59	3.00
Paris	4.90	3.10
Richmond	4.30	2.90
Frankfort	2.10	3.20
Danville	6.60	3.00
Junction City	6.60	3.00
Shelbyville	4.30	3.20
Lawrenceburg		3.20
Somerset	6.60	2.80
Burnside	6.60	2.80
Nicholasville	4.00	3.00
Versailles	7.30	3.10
Georgetown	7.10	3.20

The proposed rates are based on single line mileage scale ranging from 70 cents for 5 miles up to $2.40 for 100 miles and $3.20 for 260 miles; and joint line mileage scale ranging from 80 cents for 5 miles up to $2.60 for 100 miles.

10597. Cement, C. L., from Birmingham and North Birmingham, Ala., to stations on the Southern in Georgia and Tennessee, except stations Tallapoosa, Ga., to Atlanta, Ga., and Southern stations in Georgia (except as noted above) and Tennessee, to Hartwell stations and Knoxville & Carolina stations to be no higher than in effect from Leeds, Ala. Also to revise rate from Richard City, Tenn., to stations on the Embreeville Branch, now published as 20½ cents, to be same as from Leeds, Ala., or 19½ cents per 100 lb. The proposed revision represents reductions.

10607. Sand and Gravel, C. L., from Norris, Ga., to Savannah & Statesboro stations, viz: Brooklet, Cuyler, Savannah, Statesboro, Arcola, Blichton, Eldora, Grimshaw, Hubert, Ivanhoe, Meldrim, Olney, Pretoria, Stilson, Struckers, Ga. In lieu of combination rates at present in effect, it is proposed to establish commodity rates made by use of joint haul scale, less 10 per cent, submitted by carriers to the Georgia Public Service Commission. The proposed rate range from $1.49 to $1.74 per net ton, according to distance.

10608. Sand and Gravel, C. L., from W. Railway of Alabama sand pits to Asberry, Ala. (for Cherokee Bluffs, Ala.). In lieu of present combination rates it is proposed to establish following commodity rates, in cents per net ton, from following Alabama cities: Chehaw, Fuller, Cloughs, Franklin, 65; Baldwin Farms, Hornady, 60; Milstead, 40; Rice, Shorters, 60; Tysonville, Brassell, Oakview, Mt. Meigs, Cooks, 65; Madison Park, Vandiver Park, 71; Montgomery, 77; Cantelou's Spur, 83. It is stated the proposed rates are necessary to enable producer of sand and gravel at origins named to meet competition of crushed and ground rock which can be very cheaply produced at destination point.

11443. Cement, C. L., minimum weight 50,000 lb., Security, Md., to Charlestown, W. Va., 9 cents per 100 lb.

11463. Cement, common, hydraulic, natural or portland, C. L., minimum weight 50,000 lb., except when for carriers' convenience cars of less capacity are furnished, in which case the minimum weight will be the marked capacity of car furnished, but in no case less than 40,000 lb., from stations on L. & N. F. R. R. and Northampton & Bath R. R. to stations on the L. & N. E. R. R., Bath Portland Mills, Penn Allen, Allentown, Bath, Bethlehem, Pa., and other points, 4 cents per 100 b.

Southwestern Freight Bureau

8899. Lime, in mixed C. L., with cement, plaster, stucco, etc. To provide that rates named in Bureau and individual tariffs on cement plaster, stucco, etc., intrastate, between points in Oklahoma will also apply on lime when mixed with cement plaster, etc., lime not to exceed 25 per cent of the entire shipment.

Remarks: It is claimed that rates were recently authorized on lime in mixed C. L. with cement plaster, etc., at the highest rate and minimum weight on any of the articles contained in the shipment. It is now desired to provide for the application of the cement plaster rates and minimum weights on lime, when same does not exceed 25 per cent of the entire shipment.

8907. Chatts and Crushed Stone, to establish the following rates per 100 lb. on chatts and crushed stone, C. L., as per Items 15 and 20, Mo. Pac. R. R. Trf. No. 1464F, from and to points shown below:

	From Group 1. Zinc tailings (chatt) (as per Item No. 15).	From Group 2. Ground limestone and crushed stone, rubble or rip rap (as per Item No. 20).
Coffeyville, Kan.	$0.05½	$0.05½
Fort Scott, Kan.	.05	.05

Group 1—Alba, Asbury, Carthage, Granby, Joplin, Neck City, Orongo, Purcell, Webb City and Cartersville, Mo.

Group 2—Carthage, Joplin, Myers, Webb City, Cartersville, Mo.

Remarks: It is claimed the proposed rates are reasonable as compared with rates at present in effect from points of origin named above to Kings, Kan.

8919. Gravel. To establish rate of 6½ cents per 100 lb. on gravel, C. L., from Douglas, Kan., to Ponca City, Tonkawa and Blackwell, Okla.

Remarks: The proposed rate is the same as at present in effect from Dougherty, Okla., to same destinations and it is claimed that this rate is necessary to meet competition from Dougherty.

8928. Cement Plaster, to establish on cement plaster and articles specified on page 12, S. W. L. Trf. No. 3D, from Pyramid, Texas, to points specified in S. W. L. Trf. No. 3D, the same rates as applicable from Plasterco, Texas, as shown in above tariff.

Remarks: Proposed change is desired to provide rates for a new industry which has recently been constructed at Pyramid.

Trunk Line Association

11499. Cement, common, hydraulic and portland, C. L., minimum weight 50,000 lb., except when for carriers' convenience cars of less capacity are furnished, in which case minimum weight will be the marked capacity of the car furnished, but in no case less than 40,000 lb. from Chapman, Evansville, Lesley, Saylor, Pa., and other points, to Richland, Pleasant Valley, Springtown, Red Bridge, Riegelsville, Pa., and other points, 12 cents per 100 lb.

11522. Cement, common hydraulic, natural or portland, C. L., minimum weight 50,000 lb., except when for carriers' convenience cars of less capacity are furnished, in which case minimum weight will be the marked capacity of car furnished, but in no case less than 40,000 lb., from stations in Lehigh district to C. R. R. of N. J. stations, Nesquehoning, Hauto, Pa., L. V. railroad, Dorset, Pa., etc. Rates 9 and 9½ cents per 100 lb.

Reasons for above proposals: Rates fairly comparable with others for like distance.

Request for public hearing will be received up to July 19, 1923.

11526. Lime, common, hydrated, quick or slaked, C. L., minimum weight 36,000 lb., Staunton, Lexington, Indian Rock and Eagle Mountain, Va., to New York and Port Ivory, N. Y., $4.70 and Baltimore, Md., $3.10 per 2000 lb.

11528. Lime, carloads, minimum weight 30,000 lb., from Frederick-Strasburg Junction, Martinsburg districts to South Brooklyn railway stations, building lime 19 to 21 cents; agricultural and chemical and land lime, 18½ to 20 cents per 100 lb.

Western Trunk Line Docket

3163A. Lime, C. L., from Springfield, Mo. to Michigan, Overbrook, Swissvale, Richland, Berryton, South Topeka, Topeka, Kan. Present, 20 cents per 100 lb., minimum 24,000 lb. Proposed, 20 cents per 100 lb., minimum 30,000 lb.

3281. Lime, C. L., from Eastern defined territories to stations in Wyoming, present, as per Item 1435, minimum 30,000 lb., Tariff 111C. Proposed as per Item 1440, minimum 40,000 lb., Tariff 111C.

3202 (corrected). Crushed Marble or Crushed Whitestone, C. L., from East St. Louis, Ill., when from points in Southeastern and Carolina territories also points east of Illinois-Indiana State Line, to Kansas City, Mo. Present, Class F. 15½ cents per 100 lb.; proposed, $2 per ton of 2000 lb. Minimum weight 40,000 lb.

2556C. Sand, C. L., from Bay City, Wis., to Chicago, Ill., and points customarily taking Chicago rates. Present, 11 cents per cwt.; proposed, 9½ cents per cwt. Minimum weight, 90 per cent of the marked capacity of car, but not less than 40,000 lb.

3208. Lime, C. L., from Mankato, Minn., to Austin, Minn. Present, 9 cents per 100 lb.; proposed, 7 cents per 100 lb. Minimum weight 50,000 lb.

426A. Sand and Gravel, C. L., from sandpits west of Muncie, Kan., to points in Kansas City, Kan.-Mo., Switching District:

Miles		Present Interstate	State
14	Edwardsville and west, to but not including Forest Lake	3	3
15	Forest Lake	5	3½
16½	Cement Works Spur	5	3½
17½	Bonner Springs	5	3½
		Proposed	
14	Edwardsville and west, to but not including Forest Lake	A 3	B *1½
15	Forest Lake	3½	*1
16½	Cement Works Spur	3½	*1
17½	Bonner Springs	3½	*1

A—To Kansas City, Kan.-Mo., Switching District.

B—To points beyond Kansas City, where through rates are in effect from Muncie, Kan.

*—Over Muncie. Standard minimum weight basis. (By shipper.)

1564D. Crushed Stone, Chatts (lead or zinc mine refuse) and Stone (rubble or riprap), C. L., from Jasper, Pipestone, Quarziet, Minn., and Sioux Falls, S. D., to Iowa City and Tipton, Iowa. Present, no through commodity rates in effect. Proposed, 12 cents per 100 lb. Minimum weight 90 per cent of marked capacity of car, except when weight of shipment loaded to full visible capacity of car, the actual weight will apply; but in no case shall the minimum weight be less than 50,000 lb.

3215. Sand, other than blast, engine, foundry, glass, molding or silica; gravel, C. L., from gravel pit 7 miles west of Cherokee, Iowa, to stations in Nebraska. Present Sioux City combination. Proposed to a few points representative of the situation. (Rates in cents per ton, 2000 lb.) Minimum weight 90 per cent of marked capacity of car. (By shipper.)

To C. B. & Q. Stations	Miles	Pres.	Pro.
Laketon, Neb.	72	174	130
Allen, Neb.	99	234	150
Wareham, Neb.	123	234	170
Plainview, Neb.	151	304	180
O'Neill, Neb.	197	344	200

3217. Sand and Gravel, C. L. From Barry and Kinderhook, Ill., to various Missouri stations. Present "Class E" rates. Proposed—To a few representative points. Rates in cents per net ton.

To:	
Chillicothe, Mo.	135
Carrollton, Mo.	130
Macon, Mo.	110
Moberly, Mo.	95
Mexico, Mo.	115

Minimum weight marked capacity of car, except where cars are loaded to full carrying capacity, in which event actual weights will govern.

Atlas Rock Company Doubling Capacity

THE sand and gravel plant near Oakdale, Calif., recently purchased by A. C. McMillan, of Fresno, from the Turlock and Modesto irrigation districts, as noted in previous issues of ROCK PRODUCTS, will be rapidly expanded, according to local news dispatches.

The Atlas Rock Co. has been operating for about four months and is now getting out from 12 to 20 cars of gravel and rock and sand per day. The bulk of the present output is being used for ballasting by the Sierra railway, which company has a spur line to the plant.

According to announcement made, the new corporation will have a capital of $150,000, and has ordered additional machinery from the East which will make possible a minimum output of 4000 tons daily.

Interested with President McMillan in the new corporation is H. W. Jones, of Fresno, who is vice-president of the company, and C. I. Dennis, also of Fresno.

Judge S. L. Strother, of Fresno, and Fred C. Macomber, of Taft, are directors of the new corporation. Fred C. Beerman is manager of the Atlas company and actively in charge, with headquarters in Stockton.

Quarried from Life

By Liman Sandrock

The Growth of Charles Baumberger

Growth is the key word that unlocks the universe. Growth is God's plan. He grows everything. When He wants an oak tree, He begins with an acorn.—Dr. Frank Crane.

WHEN you and I were young editors, Maggie, our chief was eternally dinging in our ears: "For gor' sake, don't preach! Jump into your story and spin it without preachments."

Just the same, we have for the nonce nailed Doctor Crane's text to our masthead and we're going to sail under its colors until the end of this particular voyage. We will attempt to prove to you, gentle reader, that Growth is the key word that "unlocked the universe" for Charles Baumberger, president of the San Antonio Portland Cement Co.; that from a youthful acorn he has become a giant oak in the industry which he has honored by his hard work and his wisdom.

He was born in San Antonio, Texas, in January, 1863. At 6 years of age he attended school at the corner of Houston and Navarro streets. The Lone Star State had need for soldiers those days, and they filled the San Antonio children's ears with the blaring of bugles, rumbling of wagons, and the clanking of sabers—probably inspiring the youthful Charles to become a soldier—a soldier of commercial achievement.

At 17 we find him keeping books at $30 a month for Kalteyer & Son. To increase his earnings he took over the books of the Alamo Roman and Portland Cement Co., of which George Kalteyer was president. And a few years later Mr. Baumberger was that company's manager.

Some of the Texas folk of that day had the idea that the genuine, blown-in-the-bottle portland cement was made only in Portland, Maine! In fact, Mr. Baumberger has a letter, written many years ago, in which an irate customer, after reading the legend on his cement bags that his cement was made in San Antonio, accused the company of deceiving him—he wanted "the genuine article from Portland, Maine." Shades of John Smeaton!

The first portland cement ever made west of the Mississippi river was made in San Antonio. William Loyd, an Englishman with some knowledge of cement making, visited San Antonio in 1879. He found some bits of limestone in an old quarry which he believed to be cement rock. Samples were taken to George Kalteyer, who was a graduate in chemistry in Germany and he pronounced it to be natural cement rock. Mr. Kalteyer soon after organized the Alamo company.

"In those days," said Mr. Baumberger, "the Kalteyer drug store was the middle of the world. It was the gathering-place of the town. Civic business held forth behind its doors; the key of the calaboose

Charles Baumberger, president of the San Antonio Portland Cement Co.

hung there; now and then, a bad *hombre* lay dead on its floor." These things were happening while Charles Baumberger was keeping books for the Alamo. Naturally, he, too, held forth at the drug store, and here he became interested in Loyd's discovery. "Cement got under my skin; I thought of nothing else," said he.

At 20 he was manager of the Alamo, "and for many years after I had cement on my clothes and in my hair—but I never lost faith." Growth, from the planting of the acorn, isn't it?

As illustrating those Texan times when cement was first being introduced, Mr. Baumberger relates that a German farmer, in his desire to "build for permanence," bought some cement and took it home. He returned the next morning wrathful and wanted his money back. He had mixed his cement that night and in the morning—"Ach, der mortar is all in one piece, und I can't get mein hoe oudt."

In its early struggles to make its product known, the company experienced all sorts of scoffs and discouragements. For instance, the Bexar county poor farm was very near the plant, and the would-be jokers were wont to say: "Well, Charley, there's one good thing—when you go broke you won't have far to go to get to the poorhouse."

The company was capitalized at $3100. The plant consisted of some small wooden buildings, an intermittent pot kiln, a small Blake jaw crusher, a pair of rolls, and a vertical French mill. The mill was driven by a small slide-valve steam engine, and the flywheel had wooden spokes and a cast-iron rim. The mill ground about 10 barrels a day. The quarries were three miles from the railroad. All fuel had to be hauled to the mill and the finished product hauled back to the city.

In spite of all, the business grew. In 1881 the capital stock was increased to $10,000 and the name changed to Alamo Cement Co. Then the output grew to a thousand barrels a year—a fabulous amount at that time. (It is now 1500 barrels a day.) "Our commercial enthusiasm was so excited that we thought we were the greatest producers in the world," said Mr. Baumberger.

We wish we had the space to go into minute history—but this is small compass in which to "quarry from Life" and our output is greatly restricted. We must stick to our text.

Mr. Baumberger refuses to take special credit for fathering one of the commercial giants of Texas. He says: "Its success is due to the unfaltering loyalty of the men associated with me." More fruit from that little acorn.

The present plant of the San Antonio Portland Cement Co. is just outside of San Antonio, in a little town of its own—Cementville. If you were able to visit it you would find many things of exceeding interest. The comfortable, homey cottages, on well-kept streets, each having a bit of garden. These homes were built by the company, a merely nominal rent being paid by the employes. A schoolhouse has also been erected for the children. Cementville is lighted by the company's own electric plant.

There are no labor troubles for Mr. Baumberger's workers are his friends. He has grown to the size of the man who knows that there are many things to learn besides making a product—and perhaps the greatest is, what it means to be a working man.

We cannot pay greater tribute to Mr. Baumberger than to quote a local writer who visited him recently: "What I have seen represents the life of a man. It was the mind, the dauntless courage, the power of will, the refusal to acknowledge defeat when others scoffed; it was the fabric of his life, woven by years of toil into a beautiful thing, and a thing that meant much for the progress of his native city."

Editorial Comment

The American Mining Show

ROCK PRODUCTS will have a booth at the American Mining Exposition to be held in Milwaukee, Wis., September 24 to 29. We have done this every year for the past three years largely that this great non-metallic industry might be *publicly classed* as a mining industry alongside the coal industry and all the others. We believe that this is good publicity for the rock products industry and is one of those intangible things that give the industry prestige and importance in the eyes of others—something that everyone in the rock products industries will admit he needs. We have distributed passes to the Mining Show and Congress to all our subscribers in Illinois, Wisconsin, Indiana, Iowa, Minnesota and the Dakotas. If anyone else can attend we will be glad to get passes for him. If enough mineral aggregate producers will attend to make it worth while, we suggest they set some day during that week for an informal meeting and get-together at Milwaukee. Let's hear what you think of this suggestion!

Go on with Rate Fight!

The officers and directors of the National Sand and Gravel Association deserve "a rising vote" of thanks from the entire rock products industry for the courage and zeal with which they are continuing the fight for lower freight rates on sand and gravel. Because of unfortunate circumstances over which they had no control, much criticism and some abuse was heaped upon them when the now famous Central States rate case was decided against them by the Interstate Commerce Commission. Under the circumstances the decision proved something of a boomerang to the industry and there were many who thought they were better off if the case had never been undertaken.

The case was founded on justice; and was undertaken with the approval and consent of practically all those interested. Nevertheless it takes moral courage and fortitude to take that case up again and fight it through again, in the face of past criticism and of another possible defeat; but when men are so thoroughly embued with the justice of their cause and are so familiar with all its details as are the officers and directors of this National Association, there is no fair-minded man but will admire their spirit and their comeback.

The Interstate Commerce Commission, in the broadest interpretation of its functions, is now much more than a mere rate-making body; it is, to a large extent, the guardian of railway prosperity. It is responsible to the Government and the people of the United States for the earning power of the railways. Its decisions are matters of policy as well as of equity. Its decision in this particular case was perhaps a matter of policy, coming as it did, practically coincident with a horizontal decrease in all freight rates; with a very natural desire not to show partiality to any particular commodity; and without the time and means to thoroughly investigate the merits of the claims made for sand and gravel.

Just so now, we believe, it would be a matter of good policy for the commission to thoroughly investigate the fairness of rates and the earning power of the railways in the handling of sand and gravel and stone. While it is true that the railways are carrying more of these commodities at present rates than they ever carried before, to one familiar with the growth and tendencies of the industry this is only additional proof of the much greater business they could do with more equitable rates for this basic, short-haul, big-volume traffic.

The railways have issued statistics of car revenue from different classes of freight, which show that the car revenues from stone and gravel and sand are rather low as compared with automobiles and rubber boots, and other things. But these figures do not take into account the distance traveled nor the time involved, nor the terminal costs, nor many other considerations. If a fair-minded investigation of all these factors were made, we are sure that the railways could afford to haul sand, gravel and stone at lower rates and in greater volume and with greater revenue and with more profit. The time may come when the railways have enough equipment and enough business initiative to see things this way; and it should be the business of the Interstate Commerce Commission to help them see more revenue, where more revenue can be obtained by ordinary good business methods. More power to the National Sand and Gravel Association!

Cement Imports

Low ocean freight rates, favorable foreign exchange, low wages in foreign countries, coupled with an unprecedented demand for portland cement, high wages, high cost of coal and high freight rates in this country are actually resulting in considerable importations of portland cement. A news dispatch from Wilmington, N. C., states that two cargoes are due there from England and Denmark this month; and another dispatch from Los Angeles, Calif., states that city officials there expect to get bids on foreign-made cement. Undoubtedly this is a temporary condition, for enough new cement plants are under construction or contemplated in this country to take care of most any demand now in sight. Nevertheless, adventurous spirits in the industry will be figuring on plants in China, the Philippines, and the East generally, where labor and materials are cheap and likely to stay so.

Missouri Rock Asphalt Being Thoroughly Tested

THE Chillicothe (Mo.) Chamber of Commerce and other organizations in Livingston and Carroll counties are sparing no efforts in trying to find out whether the deposits of rock asphalt recently discovered in those counties are suitable for road building.

According to newspaper reports, 10 of 12 samples taken from the deposit in the Mandeville Hills section and submitted to chemists have been found to contain sufficient bitumen to meet road-building requirements. Only 2 of the 12 samples are said to have contained less than the required 7 per cent. This is explained by the fact that they were obtained near the surface and consequently were exposed.

One of the reports, signed by F. V. Reagel, engineer of materials for the Missouri State Highway Commission, is as follows:

SAMPLE OF ROCK ASPHALT

Sample sent by Harry Graham, Brand Mo. 3½ Rock, Tested June 5 and 13, 1923.

Bitumen insoluble in 86 deg. Baume Naphtha	41.4 per cent
Melting point (ball and ring)	106C.
Fixed carbon	16.8 per cent
Bitumen	7.4 per cent
Passing ½-in., retained by ¼-in. screen	6.8 per cent
Passing ¼-in., retained by 10-mesh	5.6 per cent
Passing 10 retained 40-mesh	17.2 per cent
Passing 40, retained 80-mesh	3.8 per cent
Passing 80, retained 200-mesh	50.7 per cent
Passing 200 mesh sieve	8.5 per cent

Remarks: Chemical characteristics compare very favorably with deposits being used satisfactorily. Sand grading, however, is considerably finer than any deposit with sand base now in use so far as we know. Recommend an experimental trial under traffic.

International Cement Having Prosperous Year

NET profits of the International Cement Co. for the second quarter, available for dividends, are expected to exceed $500,000, or a third larger than the $460,210 earned in the three months to March 31. This will mean that in the six months to June 30 the company has nearly covered a full year's dividend requirements on both its preferred and common shares, the latter now paying at the rate of $3 per annum.

The company's present cash balance exceeds $700,000 after payment of the June 30 dividend.

Failure to Disclose Process Voids Patent

THE Crary and Barnett patent, No. 1,193,477, for a food product and process of manufacture, was held void by a recent decision in the United States Circuit Court of Appeals, as regards claim 7 which, it was held, did not disclose invention over the prior art. A suit, alleging infringement, was based upon this claim:

"As an article of manufacture, a food product consisting of a concentrate of skimmed cow's milk and cocoanut oil from which the free fatty acids have been removed, the mixture being homogenized."

The Court of Appeals says the Federal District Court was warranted in finding it was old in the art to combine as a food product skimmed cow's milk and vegetable oils, including cocoanut oil, the mixture being homogenized. In every respect, therefore, says the court, save as to the element of removal of the free fatty acids from the oil, the claim is met by the prior art or practice. Now the court pointed out that if the patentees in this case did succeed in eliminating "principally" or wholly the free fatty acids from cocoanut oil, their discovery lay in the way in which this could be done, and not that its reduction or elimination would improve such a product.

However, the court found no disclosures in the patent pointing out how this could be done, and nothing was disclosed whereby the public generally, or those skilled in the art might produce "cocoanut oil from which the free fatty acids have been removed." In want of such disclosure alone the court held claim 7 of the patent void and dismissed the bill claiming infringement.—*Chemical and Metallurgical Engineering.*

This verifies statements in ROCK PRODUCTS that nothing is to be gained by alleged trade secrets in this day and generation.

Output of Abrasives in 1922

THE output of grindstones and pulpstones in the United States in 1922 amounted to 26,524 short tons, valued at $1,020,186, according to figures reported by the producers to the Department of the Interior through the Geological Survey. These figures show an increase of less than 1 per cent in quantity and a decrease of 17 per cent in value.

The grindstones produced amounted to 21,367 short tons, valued at $574,900, an increase of 31 per cent in quantity and 20 per cent in value. The pulpstones produced amounted to 5157 short tons (1619 pieces), valued at $445,286, a decrease of 48 per cent in quantity and 41 per cent in value. The demand at paper mills, which were very active late in 1920 and early in 1921 and which during and after the World War could not renew their supply of English stone, increased the market for domestic pulpstones in 1921, but the depression that followed this activity caused a decrease in the output of pulpstones in 1922. The grindstones were produced in Michigan, Ohio, and West Virginia and the pulpstones in Ohio and West Virginia.

The imports of grindstones and pulpstones were valued at $49,993, as against $81,880 in 1921. The exports of grindstones were valued at $281,413 as against $281,976 in 1921.

According to reports of producers, the production of scythestones, oilstones and whetstones, rubbing stones and hones in the United States in 1922 amounted to 1016 short tons, valued at $197,450, an increase in output over 1921 of 22 per cent in quantity and 14 per cent in value. These products are manufactured from stone quarried in Arkansas, Indiana, Kentucky, New Hampshire, Ohio, and Vermont.

The sales of emery increased 1163 tons, or 381 per cent, in 1922, and the average value increased to $11.93 a ton, as compared with $7.38 in 1921. There was a corresponding increase of 131 per cent in the quantity of abrasive garnet sold in 1922. The average value of the garnet per ton, however, dropped from $85.53 to $80.36. There was 35 per cent more pumice sold in 1922 than in 1921, and the average value per ton was $3.75, or 52 cents less. The output of grinding pebbles and tube mill lining increased 196 per cent and 331 per cent, respectively.

In the accompanying table the production of several abrasives for 1921 and 1922 are shown.

	1921 Short Tons	1921 Value	1922* Short Tons	1922* Value
Millstones	†	$ 24,524	†	$ 20,000
Emery	305	2,250	1,468	17,511
Garnet	3,048	260,687	7,054	566,879
Diatomaceous (infusorial)	.....	.....	.....	.....
Earth and tripoli†‡	67,474	895,629	71,000	605,000
Pumice	37,108	158,540	50,047	187,450
Grinding pebbles and tube mill lining	989	14,637	3,159	30,798

*Figures are preliminary and subject to revision.
†Figures not available, as product was not reported by weight.
‡Includes rottenstone and for 1921 an estimate for part of the diatomaceous earth.

Production of Lime in Germany

LIME production in Germany in 1922, according to the statistics of the German Lime Association, totaled 4,354,000 tons—an increase of 306,000 tons, or 7.5 per cent, over that of 1921. Domestic demand was brisk throughout the year, while foreign business was dull with only unimportant sales to the Netherlands, Denmark and Czechoslovakia.

Consumption of lime in the following industries in 1922 increased, as compared with 1921, by the following amount: Building, 176,890 tons, or 10.5 per cent; chemical, 56,587 tons, or 22 per cent; lime fertilizers, 2 per cent; iron and steel, 119,322 tons, or 14 per cent.

German sales of burnt lime for agricultural purposes in 1922 amounted to 124,676 tons, or 19 per cent, less than in 1921. The sugar industry in 1922 took 977 tons, or 11 per cent less than in 1921.

Germany is a country of something like 250,000 square miles and a population of 60,000,000. The United States has an area of 3,000,000 square miles and a population of 110,000,000, yet its annual production of lime has never equalled the figure for Germany in 1922. Perhaps better than anything else this illustrates the possibilities of developing an annual tonnage of at least 8,000,000 in this country with no other uses for lime than those now in vogue.

New Machinery and Equipment

A New Gasoline Shovel

A GASOLINE-DRIVEN power shovel operated entirely with gears and shafts is the latest improvement of the Orton & Steinbrenner Co., Chicago, Ill. This company has had 15 years experience in the design and manufacture of shovels and cranes.

During the past few years, because of the development of the gasoline motor, various schemes have been put forward in attempting to adapt this form of power to a dipper shovel; but it was necessary to provide an arrangement to take the place of the independent source of power for the reversible crowding motion of the dipper stick.

Sprocket and chain arrangements and wire rope drives, while temporarily successful, cannot stand up under severe usage, says the company. Especially is this true where the cables are bent over a number of small-diameter sheaves and drums, and reversing curves are introduced. Loss of power and frequent breakage render the rope type of drive absolutely unreliable.

The positive gear drive on the O. S. is simple and the number of parts are few, it is said. At the bottom of the boom connection is a shaft carrying double steel bevel gears and bronze friction clutches. This shaft is concentric with the pivot of the boom and consequently independent of its position. The boom can be used at any angle to suit the exigencies of the work.

Along the boom is a steel shaft carrying two bevel pinions, one meshing at the bottom with the gears on the horizontal shaft, and the other at the top meshing with gears on a countershaft located about half way up the boom. This latter shaft carries a brake and "slip friction," and is geared directly to the cast steel rack on the dipper stick. With this method, a minimum number of levers are required, the operator being at ease all the time. Power is supplied by a heavy-duty four-cylinder "Climax" motor designed for economy.

Another exclusive feature claimed for this machine is the flexible crawling tread. Full advantage has been taken of the experience gained in the design of tanks used in the World War. It was proved that flexibility and lubrication of the tread and tread rollers were necessary to their proper operation.

These flexible treads adjust themselves readily to the ground surface, equalizing the weight of the machine and distributing it over a considerable length of tread, instead of concentrating it on one roller or tread.

"Alemite" fittings provide the most effective means for greasing the bearings.

Steering is accomplished by one man in the cab. The drive is by means of steel shafting and bevel gears throughout; positive power is secured. The main gears are large, slow moving and shrouded.

On the main horizontal drive shaft are two brake wheels by which each tread may be operated either independently or together. The mechanical differential arrangement is similar to that used on automobiles.

When used as a crane, the only thing required is that the shovel boom is taken off, the crane boom attached, the crowding frictions for operating the dipper being carried by the shovel boom and an integral part of it removed. The shovel, when furnished with double drums, can be used interchangeably with the crane, thus saving the cost of a new machine. With the crane boom attached, any type of bucket or scoop can be used, and pile-driver leads may be swung from the tip of the boom.

Simplicity of parts in this gasoline shovel makes possible converting the shovel into a clamshell outfit, dragline or skimmer rig

Gasoline shovel with flexible crawling tread

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Prospect, N. Y.	.80	1.40	1.40	1.30	1.30	.....
Walford, Pa.	1.55	1.55	1.55	1.55	1.55	1.55
Watertown, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.50@2.00	.....	1.50	.....	.....	.....
Buffalo, Iowa	.70	.....	1.35	1.15	1.20	1.20
Bloomville, Middlepoint, Dunkirk, Bellevue, Ohio	1.00	1.10	1.10	1.00	1.00	1.00
Chasco, Ill.	1.30	1.25	1.25	1.25	1.20	.....
Chicago, Ill.	.80	1.50	1.10	1.10	1.10	1.10
Dundas, Ont.	.95	1.35	1.35	1.35	1.10	1.10
Greencastle, Ind.	1.25	1.15	1.05	1.05	.95	.95
Krause, Columbia and Valmeyer, Ill.	1.20	1.20	1.35	1.35	1.20	1.20
Lannon, Wis.	.80	1.10	1.10	1.00	1.00	.90
Mitchell, Ind.	1.00	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.90	1.20	1.10	1.00	.95	.95
Montrose, Iowa	.....	1.50	1.60	1.55	1.45	1.40
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern Illinois	1.35	1.30	1.30	1.30	1.25	.....
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.35	1.35	1.35	1.35
Stone City, Ia.	.75	.....	1.50	1.40	1.30	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.00	2.00	2.00
			Prices include 90c freight			
Waukesha, Wis.	1.00	1.00	1.00	1.00	1.00	1.00
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	.....
Bridgeport, Texas	1.10	1.40	1.35	1.35	1.25	1.25
Bromide, Okla.	.75	2.00	1.75	1.60	1.50	1.25
Cartersville, Ga.	1.25	1.60	1.60	1.00	1.20	1.15
Chickamauga, Tenn.	1.00	1.00@1.25	.....	1.00@1.25	1.00@1.25	.....
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.80	1.60	1.60	1.50	1.40	.....
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	.....	.....	1.40	1.40	1.40	.....
Morris Spur (near Ft. Worth), Tex.	1.10	1.35	1.30	1.25	1.25	1.20
WESTERN:						
Atchison, Kans.	.50	2.00	2.00	2.00	2.00	1.90
Blue Spr'gs and Wymore, Neb.	.20	1.50	1.50	1.40	1.30	1.25
Cape Girardeau, Mo.	1.35	.....	1.10	1.35	1.10	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.50	1.35	1.15	1.00	.....
Bound Brook, N. J.	1.70	2.10	1.80	1.50	1.40	.....
Dresser Jct., Wis.	1.00	2.25	.....	1.75	2.00	.....
Duluth, Minn.	1.00	2.25	2.00	1.50	1.40	.....
E. Summit, N. J.	1.80	2.30	1.90	1.60	1.40	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50@2.00	1.35@1.50	1.15@1.25	1.00@1.10	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.50*	.....	1.50*	1.50*	1.50*	.....
San Diego, Calif.	1.80	1.80	1.50@1.80	1.25@1.55	1.25@1.55	1.10@1.35
Spring Valley, Calif.	.70	1.55	1.50	1.40	1.35	1.35
Springfield, N. J.	1.80	2.30	1.90	1.60	1.40	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.47	2.07	2.07	1.97	1.97	.....
Buffalo, N. Y.—Granite	.90	.....	1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.—Granite	.50	2.25	2.25	2.00	2.00	2.00
Eastern Penna.—Sandstone	.85	1.60	1.55	1.35	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	1.75	1.75	1.40	1.40	1.25
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@1.50
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yard. †Agrl. lime. ||R.R. ballast. §Flux. ‡Rip-rap, a 3-inch and less.

Agricultural Limestone

(Pulverized)

Chaumont, N. Y.—Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$—Thru 100 mesh; sacks, 4.00; bulk	2.50
Grove City, Pa.—Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$; 60% thru 100 mesh; 45% thru 200 mesh; 100% thru 20 mesh; sacks, 5.00	3.50
Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, 5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
New Castle, Pa.—96% $CaCO_3$ 1.40% $MgCO_3$—75% thru 100 mesh, 94% thru 50 mesh; sacks, 5.00; bulk	3.50
Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk	3.00
Watertown, N. Y.—Analysis, 96% $CaCO_3$; .02% $MgCO_3$; 90% thru 100 mesh; bulk, 3.00; sacks	4.50
West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75—cloth, 5.25; bulk	3.25
Alton, Ill.—Analysis, 98% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 100 mesh	6.00
Belleville, Ont.—Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk	2.50
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 90% thru 100 mesh..	5.00
90% thru 50 mesh	1.35
Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh	1.80@3.80
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 80-lb p. sacks 5.00; bulk	3.50
Piqua, Ohio—100% thru 10 mesh, 2.10; 50% thru 100 mesh, 2.25; 80% thru 100 mesh, 5.00; 100% thru 100 mesh; bags 7.00; bulk	5.50
Waukesha, Wis.—Analysis, neutralizing equivalent 107.38% $CaCO_3$; 99% thru 10 mesh, 55% thru 60 mesh; bulk	2.35
200-mesh bags ex., returnable	4.50
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 50% thru 100 mesh	1.50
Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk	2.70
Knoxville, Tenn.—80% thru 100 mesh, bulk (bags 1.25 extra)	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; bulk	2.75
Mountville, Va.—Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 100% thru 20 mesh; sacks	5.00
Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Lemon Cove, Calif.—Analysis, 94.8% $CaCO_3$, 0.42% $MgCO_3$; 60% thru 200 mesh; sacks, 5.25; bulk	4.50

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.1% $MgCO_3$; 90% thru 50 mesh	1.50
Bellevue, Ohio—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh	1.25
Bettendorf, Iowa, and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Buffalo, Iowa—90% thru 4 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 100% thru 10 mesh, 90% thru 50 mesh	1.50
90% thru 4 mesh, cu. yd	1.35
Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$; 90% thru 4 mesh	.80
Columbia, Ill., near East St. Louis—¼-in. down	1.25@ 1.80
Elmhurst, Ill.—Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$; 50% thru 50 mesh	1.25
Huntington and Bluffton, Ind.—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; about 20% thru 100 mesh	1.25

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Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	2.00
Kansas City, Mo.—50% thru 100 mesh	1.50
Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh	1.20
Ladds, Ga.—Analysis, 61% $CaCO_3$, 35% $MgCO_3$—all passing 10 mesh	1.50@ 1.75
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 83% thru 10 mesh; bulk	1.25
Milltown, Indiana.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 33.6% thru 100 mesh, 40% thru 50 mesh	1.25@ 1.65
Mitchell, Ind.—Analysis, 97% $CaCO_3$, 1% $MgCO_3$; 50% thru 100 mesh, 90% thru 4 mesh	1.25
Montrose, Iowa.—90% thru 100 mesh	1.25
Narlo, Ohio.—Analysis, 56% $CaCO_3$ 43% $MgCO_3$; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh	1.50@ 2.00
Ohio (different points), 20% thru 100 mesh, bulk	1.25@ 1.50
Piqua, Ohio—100% thru 4 mesh	1.25
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ⅛-in. mesh	1.30
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Toledo, Ohio.—¼ in. to dust, 30% thru 100 mesh	1.50
Waukesha, Wis.—No. 1 kiln dried	2.00
No. 2 Natural	1.75
Alderson, W. Va.—Analysis, 90⅓% $CaCO_3$; 90% thru 50 mesh	1.75
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh	1.50
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$; 90% thru 50 mesh	3.00
50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Ladds, Ga.—50% thru 50 mesh	2.00
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCO_3$; 50% thru 50 mesh	.50
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk	1.80
Tulsa, Okla.—90% thru 4 mesh	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.25@ 2.50
Cedarville and South Vineland, N. J.—Damp, 1.75; dry	2.25
Cheshire, Mass.	7.50@ 8.00
Columbus, Ohio	1.50@ 2.00
Dunbar, Pa.—Damp	2.50
Falls Creek, Pa.	2.25
Hancock, Md.—Damp, 1.50; dry	2.00
Klondike and Pacific, Mo.	2.00@ 2.50
Mapleton, Pa.	2.25@ 2.50
Mapleton Depot, Pa.—Damp, 2.00 dry	2.75
Massillon, Ohio	3.00
Michigan City, Ind.	.50
Millville, N. J. (green)	2.00
Mineral Ridge, Ohio	3.00
Montoursville, Pa.	2.00
Oregon, Ill.	2.50
Ottawa, Ill.	1.50
Pittsburgh, Pa.—Dry, 4.00; damp	3.00
Rockwood, Mich.	2.50@ 2.75
Round Top, Md.	2.25
Sands, Pa.	2.50
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	2.50@ 3.00
Thayers, Pa.	2.00@ 2.50
Utica, Ill.	1.40@ 1.75
Zanesville, Ohio	2.00@ 2.50
Foundry Sand:	
Albany, N. Y.—Molding fine	2.25
Molding coarse	2.00
Sand blast (kiln dried)	4.50
Brass molding	2.25
Allentown, Pa.—Core and molding fine	1.75@ 2.00
Arenzville, Ill.—Molding fine	1.50@ 1.75
Brass molding	1.75
Beach City, Ohio.—Core, washed and screened	2.00@ 2.50
Furnace lining	2.50@ 3.00
Molding fine and coarse	2.25@ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00
Cleveland, Ohio.—Molding coarse	1.50@ 2.00
Brass molding	1.50@ 2.00
Molding fine	1.50@ 2.25
Core	1.25@ 1.50

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Wholesale Prices of Sand and Gravel

Prices given are per ton, f.o.b., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Attica, N. Y.	.75	.75	.75	.75	.75	.75
Ambridge and So. Heights, Pa.	1.25	1.25	1.25	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		.90		1.00	1.25	
Farmingdale, N. J.	.48	.48	.75		1.10	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75		1.35	1.25
Machias, N. Y.	.75	.75	.85	.85	.85	.85
Pittsburgh, Pa.	1.25	1.25	1.25	.85	.85	.85
Portland, Me.		.50	1.75		1.35	1.35
Washington, D. C. (Rewashed, river)	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.50	.40				.90
Barton, Wis.		.40@ .60		.50@ .70	.50@ .70	
Beloit, Wis.		.70			.80	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Dresden, Ohio	.70	.60	.60		.90	
Earlestead (Flint), Mich.	.70					
Eau Claire, Wis.	.40	.40	1.00@1.25			.85@ .90
Elkhart Lake, Wis.	.70	.60	.76	.80	.70	.70
Ft. Dodge, Iowa		1.22		2.17		
Grand Rapids, Mich.		.50		.80	.70	
Hamilton, Ohio	1.00	1.00	1.00		1.00	
Hawarden, Iowa	.60	.50			1.60	
Hersey, Mich.	.50	.50	.60		.80	.75
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.70	.65	1.70	1.65	1.65	1.65
Mankato, Minn. (pit run)	.50	.50	.60	1.35		1.35
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Minneapolis, Minn.	.35	.35	1.25@1.35	1.25@1.35	1.25	1.25
Moline, Ill.	.60@ .80	.60@ .80	1.20@1.50	1.20@1.50	1.20@1.50	1.20@1.50
Riton, Wis.		.40			.60	
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65	1.45		1.45
St. Louis, Mo., deliv. on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Terre Haute, Ind.	.75	.75	.75	.90	.90	.90
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.40	.40	1.25	1.10	1.10	
			(.05 ton discount 10 days)			
SOUTHERN:						
Atlanta, Ga.	1.24	1.24	2.79	1.90	1.90	1.90
Birmingham, Ala.	1.29	1.29	2.79	1.79	1.64	1.54
Charleston, W. Va.	all sand 1.40		all gravel 1.50			
Estill Springs, Tenn.	1.35	1.35		1.00	.85	.65
Ft. Worth, Texas		1.50	1.50	1.50	1.50	1.50
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	.75@1.00	.75@1.00	1.20	1.20	1.20	1.20
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.00	1.00	1.80	1.80	1.80	1.80
N. Martinsville, W. Va.	1.00	1.00		1.20	1.00	.80
New Orleans, La.	.25			.85		
Roseland, La.				.85	.85	
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.		(Kaw river sand, car lots, .75 per ton; Missouri river, .85)				
Los Angeles, Calif.		.70	1.20	1.20	1.10	1.10
Pueblo, Colo.	1.10*	.90*		1.50*		
San Diego, Calif.†	.50@ .70	.80@1.00	1.30@1.60	1.35@1.65	1.10@1.40	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.25*	1.25*	1.50*	1.25*		1.25*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 in.	Sand, ¼ in.	Gravel, ½ in.	Gravel, 1 in.	Gravel, 1½ in.	Gravel, 2 in.
Atlanta, Ga.	.30@ .40	.30@ .40				
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, .80 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dresden, Ohio		.60				
Dudley, Ky. (crushed sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.	.70	.50			.60	.60
Estill Springs, Tenn.						.85
Fishers, N. Y.		.60			.55@ .60	
Grand Rapids, Mich.						.50
Hamilton, Ohio					.70	
Hartford, Conn.		1.00*				
Hersey, Mich.				.55		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas			.55	.55	.55	
Janesville, Wis.		.65			.65@ .75	
Montezuma, Ind.			Road gravel .50 per ton			
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.	.25					
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			Bank run gravel 1.55			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas		.80		1.50		1.30
Winona, Minn.	.40	.40	.60	.60		
York, Pa.		1.00@1.20	(crushed rock sand)			

* Cubic yard. B Bank. L Lake. || Ballast † Low prices, wholesale; high prices, retail.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25@2.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.15	1.05
Eastern Penn. and Northern N. J.	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.50	.80	1.25	.90	.90	.80	.80
Erie, Pa.		Crushed run slag, 4 in. and less, 1.25@1.35					
Emporium, Pa.			1.35	1.35	1.35	1.35	1.35
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Penn.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, 1.50, f.o.b. Chicago				
Detroit, Mich.			All sizes, 1.65, f.o.b. Detroit				
Ironton, O.	2.05	1.45	1.80	1.45	1.45	1.45	1.45
Jackson, O.		1.35		1.35	1.35	1.35	1.35
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.50	1.35	1.35	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
Steubenville, Lowellville, Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton and Low Moor, Roanoke, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Adams, Mass.			7.00				2.90	
Bellefonte, Pa.		10.50§	10.50§	10.50§	9.00		8.50	1.80
Buffalo, N. Y.				12.50				
Berkeley, R. I.			12.00					2.30
Cassadaga, N. Y.			Agricultural marl 7.00					
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
West Rutland, Vt.	13.50	12.00					11.00	3.20
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		11.50	11.50	12.50				1.85
Zylonite, Mass.	3.20d	2.90d	7.00					
CENTRAL:								
Cold Springs, Ohio		11.00	11.00				10.00	
Delaware, Ohio		11.00	9.50	11.50			10.00	1.60
Gibsonburg, Ohio	12.50	11.00	11.00		9.00	11.00	10.00	
Huntington, Ind.	12.50	11.00	10.00		9.00		10.00	1.60
Luckey, Ohio	12.50a	11.00	10.00a		9.00			
Marblehead, Ohio		11.00	10.00				10.00	1.60
Marion, Ohio		11.00	10.00				10.00	1.80
Mitchell, Ind.				12.00	11.00		10.00	1.60
Sheboygan, Wis.							10.00	
White Rock, Ohio	12.50				9.00	11.00		
Woodville, O. (dlrs.' price)	12.50a	11.00a	10.00a		9.00		10.00	1.60
SOUTHERN:								
Erin, Tenn.							9.00	1.50
El Paso, Texas							9.00	1.50
Karo, Va.							7.00	
Knoxville, Tenn.	12.50	11.00	11.00	11.00	9.00		9.00	1.50
Ocala and Zuber, Fla.	14.00	14.00		14.00				1.75
Sherwood, Tenn.	12.50	11.00	11.00	11.00			8.50	1.50
Staunton, Va.					4.50	5.50	8.50	1.35
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							12.50	
San Francisco, Calif.	21.50	21.50	15.00	21.50			18.50	2.40
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; $paper sacks. (a) 50-lb. paper bags; terms, 30 days net, 25c per ton or 5c per barrel discount for cash in 10 days from date of invoice; (b) burlap bags; (c) 200-lb. barrels; (d) 280-lb. barrels net.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio.—Core	.50@	2.00
Sand blast	4.50@	5.50
Molding fine	2.75@	3.00
Brass molding		2.50
Furnace lining	1.50@	2.00
Sand blast	3.50@	5.00
Molding coarse	1.50@	2.00
Stone sawing	1.50@	3.50
Traction	.50@	.90
Delaware, N. J.—Molding fine		2.00
Molding coarse		1.90
Brass molding		2.15
Dunbar, Pa.—Traction, damp		2.50
Dundee, Ohio.—Glass, core, sand blast traction		2.50
Molding fine, brass molding (plus 75c for winter loading)		2.00
Molding coarse (plus 75c for winter loading)		1.75
Eau Claire, Wis.—Core	1.00@	1.25
Sand blast	3.25@	3.75
Falls Creek, Pa.—Molding, fine and coarse		1.75
Sand blast		2.00
Traction		1.75
Franklin, Pa.—Core		2.00
Furnace lining		2.50
Molding fine and coarse		2.00
Brass molding		2.00
Greenville, Ill.—Molding coarse	1.30@	1.60
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled		.80
Bank run		.65
Kansas City, Mo.—Missouri river core		.80
Kasota, Minn.—Molding fine	1.60@	1.85
Molding coarse, stone sawing	1.45@	1.75
Klondike, Pacific, Gray Summit, Mo.—Molding fine and coarse, stone sawing		2.00
Mapleton Depot, Pa.—Traction		2.00
Molding fine, damp		2.00
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp, 2.00; dry		2.75
Massillon, Ohio—Molding fine and coarse, furnace lining, core		3.00
Traction		2.75
Michigan City, Ind.—Core, traction		.50
Mineral Ridge, Ohio.—Core (green)		2.25
Furnace lining, molding fine and coarse; roofing sand, sand blast, stone sawing, traction brass molding (green)		2.00
Montoursville, Pa.—Core	1.35@	1.40
Traction	1.00@	1.10
Brass molding		1.25
New Lexington, Ohio—Molding fine		2.25
Molding coarse		2.00
Oregon, Ill.—Core	1.50@	2.00
Sand blast		4.00
Stone sawing	2.00@	2.50
Ottawa, Ill.—Core	1.50@	2.00
Furnace lining and traction		1.50
Roofing sand		1.75
Sand blast		4.50
Stone sawing		3.00
Brass molding		2.50
Molding, coarse (crude)	.85@	1.00
Ottawa, Minn.—All crude silica sand	.75@	1.00

Miscellaneous Sands

(Continued)

Rockwood, Mich.—Core	1.90@	2.50
Roofing		2.75
Sand blast		3.75
Round Top, Md.—Core (damp)		1.60
Traction (damp)		1.75
Roofing sand		2.25
San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@	3.50
(Direct from pit)		
Furnace lining, molding coarse, sand blast		3.60
Stone sawing, traction		2.30
St. Louis, Mo.—Red heavy molding	1.50@	2.25
Red fine	1.50@	2.00
Molding fine and brass	2.00@	3.00
Skein core	1.75@	2.25
White core sand	1.00@	1.75
Sand blast	2.00@	4.50
Furnace lining	1.50@	2.50
Sand blast	2.00@	4.50
Roofing sand	1.00@	1.50
Stone sawing	1.25@	2.00
Thayers, Pa.—Core		2.00
Furnace lining, molding fine and coarse		1.25
Traction		2.25
Utica, Ill.—Core, furnace lining		1.00
Molding fine		.85
Molding coarse		.90
Roofing sand and stone sawing	1.40@	2.50
Sand blast		2.50
Traction		1.40
Warwick, Ohio.—Furnace lining, dry 2.75, green		2.00
Molding fine and coarse, dry 2.75, green		1.75
Traction and brass molding		2.50
Zanesville, Ohio.—Molding fine, brass molding	1.75@	2.00
Molding coarse	1.50@	1.75

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Best white and 200-mesh (per ton)		8.00
Yellow (per ton)		9.00
Red (per ton)		13.00
Baltimore, Md.—Crude talc (mine run)		3.50
Ground talc (20-50 mesh), bags		10.00
Ground talc (150-200 mesh), bags		12.00
Cubes		60.00
Blanks (per lb.)		.08
Chatsworth, Ga.—Grinding		5.00
Ground talc (150-200 mesh); bags		12.00
Pencils and steel workers' crayons (gross)	1.50@	2.50
Chester, Vt.—Ground talc (150-200 mesh), bulk	6.50@	8.50
(Bags 1.00 extra)		
Emeryville, N. Y.—325 mesh (double air floated), bags		14.75
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags		18.00
Henry, Va.—Crude talc (lump mine run) per 2000-lb. ton	2.50@	3.50
(150-200 mesh), bags	10.00@	12.50
Los Angeles, Calif.—Crude	15.00@	22.00
Los Angeles, Calif.—Crude talc f.o.b. Silver Lake	7.00@	12.00
Ground talc (150-200 mesh), 100-200 lb. bags)	12.00@	14.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk, 5.00; bags		6.00
(150-200 mesh); bulk, 7.00; bags		8.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@	13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@	10.00
Ground talc (150-200 mesh), bulk	10.00@	22.00
Vermont—Ground talc (20-50 mesh); bags	7.50@	10.00
Ground talc (150-200 mesh); bags	8.50@	15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk		5.00
(Bags 1.00 extra)		
Ground talc (150-200 mesh), bulk	8.00@	14.00
(Bags 1.00 extra)		
Pencils and steel workers' crayons, per gross	1.20@	2.00

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%	6.00@	8.50
B.P.L. 65%		6.00
Gordonsburg, Tenn.—B.P.L. 68-72%	5.50@	6.50
Mt. Pleasant, Tenn.—Analysis, .65-70% B.P.L. (2000 lb.)		6.50
Paris, Idaho.—2000 lb. mine run, B.P.L. 70%		3.50

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$8.40	$8.10	$7.50
24x14	10.20	8.40	8.10	7.50
22x12	10.80	8.70	8.40	7.80
22x11	10.80	8.70	8.40	7.80
20x12	12.60	9.00	8.70	8.10
20x10	12.60	9.00	8.70	8.10
18x10	12.60	9.00	8.70	8.10
18x 9	12.60	8.70	8.40	7.80
16x10	12.60	8.70	8.40	7.80
16x 9	12.60	8.70	8.40	7.80
16x 8	12.60	9.00	8.70	8.10
18x12	12.60	8.70	8.40	7.80
16x12	11.10	8.40	8.10	7.50
14x10	11.10	8.40	8.10	7.50
14x 8	9.30	8.10	7.50	7.50
14x 7 to 12x6	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. ton	
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@ 8.00
Centerville, Tenn.—B.P.L., 60-65%	6.50
B.P.L. 75% (brown rock)	12.00
Benotis, Fla.—Analysis 77-82% B.P.L.	8.00
Montpelier, Idaho. — Analysis, 72% B.P.L., crushed and dried	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50@ 7.00
Twomey, Tenn.—B.P.L. 65%	6.50

Florida Soft Phosphate

(Raw Land Pebble)

	Per Ton
Benotis, Fla.—Analysis 26-28% phosphoric acid—200 lb. sacks, carload lots	10.00
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

	Per Ton
Jacksonville, Fla., District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65% B.P.L.	5.95

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	16.00@20.00	16.00@20.00
Slate granules		6.50@ 7.00
Granville, N. Y.—Red slate granules		7.50
Harrisonburg, Va.—Blk. marble (crushed, in bags)		12.50
Ingomar, Ohio (in bags)	6.00@14.00	10.00@25.00
Milwaukee, Wis.		16.00@30.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsburg, N. J.	16.00@20.00	14.50@18.00
Poultney, Vt.—Slate granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.—(2000 lb.)		6.00@12.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags 12½c extra	4.50	4.50

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	27.00@35.00
Carpenterville, N. J.	18.50	31.50@41.50
Easton, Pa.	16.00	40.00@60.00
Ensley, Ala.	16.00	26.00
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	22.00	32.00
Houston, Tex.		19.50
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore. (Del'd)	21.00	45.00@55.00
Puyallup, Wash.	20.00	30.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@45.00
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Springfield, Ill.	18.00	20.00@25.00
Wauwatosa, Wis.	14.00@15.00	26.00@65.00
Watertown, N. Y.	21.00@22.50	35.00@37.50
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	11.00
Boston, Mass.	16.50
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	12.00
Lancaster, N. Y.	14.00
Michigan City, Ind.	12.00
Milwaukee, Wis. (delivered)	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Rives Junction, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Texas	13.00
San Antonio, Texas (deliv. city lts.)	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	20.00
F.o.b. cars	16.00
Washington, D. C.	14.50

Gray Clinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Finishing	Hydrate per Ton Common
Atlanta, Ga.	23.50	15.00
Baltimore, Md.	24.25	17.25
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	22.00	22.00
Denver, Colo.	24.00	.....
Detroit, Mich.	21.00	20.00
Kansas City, Mo.	28.00	24.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	16.00
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.78
Boston, Mass.	.....	2.68
Buffalo, N. Y.	.....	2.53
Cedar Rapids, Iowa	.62	2.48
Cincinnati, Ohio	.63½	2.54
Cleveland, Ohio	.61½	2.46
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.49
Dallas, Texas	.55	2.20†
Davenport, Iowa	.60¾	2.43
Dayton, Ohio	.....	2.48
Denver, Colo.	.....	2.65
Detroit, Mich.	.62	2.48
Duluth, Minn.	.56¼	2.14
Indianapolis, Ind.	.60¾	2.41
Kansas City, Mo.	.61½	.....
Los Angeles, Cal. (less 5c dis.)	.....	3.26
Memphis, Tenn.	.....	2.84
Milwaukee, Wis.	.59¼	2.37
Minneapolis, Minn.	.62½	2.39
Montreal, Canada (sks. 20c ext.)	.....	2.40
New Orleans, La.	.....	2.83
New York, N. Y.	.....	2.40‡
Philadelphia, Pa.	.....	2.56
Phoenix, Ariz.	.....	3.70
Pittsburgh, Pa.	.56	2.35
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.63*
St. Louis, Mo.	.58¾	2.35
St. Paul, Minn.	.62½	2.39
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Spokane, Wash.	.....	.....
Toledo, Ohio	.62	2.48

†Sack 10c ext.; 10c dis. 10 days.
‡Alongside dock, 2.70.
*Warehouse, 3.15.
NOTE—Add 40c per bbl. for bags.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Cincinnati, Ohio	.....	3.00†
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.15
Dayton, Ohio	.....	2.85†
El Paso, Tex.	.....	3.20*
Hannibal, Mo.	.....	2.10
Hudson, N. Y.	.....	2.20
Indianapolis, Ind.	.....	2.96†
Leeds, Ala.	.....	2.20
Los Angeles, Calif.	.....	2.80
Louisville, Ky.	.....	2.92†
Memphis, Tenn.	.....	3.24†
Northampton, Pa.	.....	2.10
Phoenix, Ariz.	.....	4.30‡
Steelton, Minn.	.51½	1.95
Universal, Pa.	.50	2.00

†Including cloth sacks.
*Gross, 10c sacks and 10c per bbl. disc 10 days.
‡Gross, 15c sacks and 5c per bbl. disc. 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	¼x32x36" Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	⅜x32 or 48" Lengths 6'-10", 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	11.00	11.50	.....	.....	33.75	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton

News of All the Industry

Incorporations

The Detroit Cast Stone Co., 8506 South street, Detroit, Mich., has increased its capital stock from $50,000 to $100,000.

The Gold-Black Sand Mining Co., Great Falls, Mont., has been incorporated for $50,000 by A. W. Kingsbury, O. F. Wadsworth, and others.

The Humpich Sand Co., Louisville, Ky., has been incorporated for $21,000 by Ben Humpich, John P. Hermann and F. J. Hermann.

The I. N. Stone Co., Cleveland, Ohio, has been incorporated for $500 by Frank G. Mooney, Ira J. Warner, Irwin N. Loeser, L. R. Davis, and I. L. Nichols.

The Guadalupe Portland Cement Co., San Francisco, Calif., has been incorporated for $3,000,000; shares, 30,000 at $100 each; subscribed, $500.

The Standard Plaster Products Co., Los Angeles, Calif., has been incorporated for $2,000,000; shares, 20,000 at $100 each; subscribed, $300.

The Indiana Concrete Products Co., Indianapolis, Ind., has been incorporated for $10,000. The directors are Charles E. Phillips, Joseph Erpelding, Lawrence Erpelding, Vincent Erpelding, and Nora D. Erpelding.

The Norton Sand Co., New York City, has been incorporated for $20,000 by J. L. Carty and D. Reiss. (Attorney J. A. Byrne, 305 Broadway.)

The Midway Lime and Cement Co., Culver City, Calif., has been incorporated for $50,000; shares, 5000 at $10 each; subscribed, $4500.

The Apex Crushed Rock and Sand Co., Los Angeles, Calif., has been incorporated for $225,000. Address, William H. Light, 711 Blach building.

The Pratt Rock and Gravel Co., 518 Hearst building, San Francisco, Calif., has been incorporated for $400,000.

The National Gypsum Products Co., Pacific Mutual building, Los Angeles, Calif., has been incorporated for $750,000.

The West Coast Rock Co., San Francisco, Calif., has been incorporated for $150,000. Address: John B. Haas, 716 California street.

The Morocco Sand and Gravel Co., Morocco, Ind., has been incorporated for $25,000. Directors: M. E. Graves, J. R. Deardurff, Ross Lucas, J. B. Redden, Frank Billings, and Fred G. Richmire.

The Vermont Marble Co., a Vermont corporation, has been incorporated for $5000 to quarry and manufacture marble and other stone in Indiana. Earl H. Blakely, Indianapolis, is agent.

The Service Rock Co., 1102 Bank of Italy building, Los Angeles, Calif., has been incorporated for $500,000.

The Inter-State Cut Stone Co., Bedford, Ind., has increased its common capital from $17,500 to $167,500.

The Marion County Lime Co., Ocala, Fla., has been incorporated for $100,000. E. F. Fitch is president, and Jack Camp, secretary and treasurer, both of Ocala.

The Kinsman Cut Stone Co., Cleveland, Ohio, has been incorporated for $1000 by S. L. Russell and J. S. Badger.

The American Cement Securities Corp., Philadelphia, Pa., has been incorporated for $3,000,000. Address: T. L. Croteau, Wilmington, Del.

The American Magnesia Cement Corp., Philadelphia, Pa., has been incorporated for $250,000. Address: Guarantee and Trust Co.

The Lawrence Stone and Gravel Co., Raleigh, N. C., has been incorporated for $1,000,000.

Kerr Portland Cement Co., Moundsville, W. Va., has been incorporated for $2,000,000.

The Solhar Concrete Products Co., Wilmington, Del., has been incorporated for $850,000 to manufacture concrete and cement products. M. M. Lucey, Wilmington, is an incorporator.

The California Stucco and Plaster Supply Co., 149 East Miles street, Los Angeles, Calif., has been formed by H. C. Peterson, George G. Rasmussen, and Mirus Kirk.

The Greenlawn Gravel Co., Columbus, Ohio, has been incorporated for $50,000 by Herbert H. Gill, Harry Leyton, C. O. Rhoades, George Murphy, and L. J. Paulson.

The Bronx River Sand and Gravel Corp., Bronx, New York City, has been incorporated for $125,000; W. B. Waldo, A. J. and A. J. Stone, Jr. (Attorneys Breed, Abbott & Morgan, 32 Liberty street).

Cement

The Riverside Portland Cement Co. has purchased the property of the Golden State Portland Cement Co., at Oro Grand, Calif. The Golden State plant originally comprised two 8x125-ft. kilns. The Riverside company is adding three additional kilns of the same size and expects to have them all in operation by September 1; plans for a new plant in Arizona have been postponed temporarily while the company is busy getting its Oro Grand plant under way.

The Monolith Portland Cement Co., Monolith, Calif., expects within the next fiscal year to enlarge the plant to triple capacity, according to H. E. Ish, district freight and passenger agent of the Southern Pacific. "The capacity is now from 1800 to 2000 bbl. daily," said Mr. Ish. "The entire plant is working full blast and all the orders cannot be filled. Most of the finished product is shipped to points in the San Joaquin valley. Before another year is over the plant should be able to produce 6000 bbl. a day, provided the plans for the enlargement of the factory are approved."

The Universal Portland Cement Co., Buffington, Ind., will install a mechanical dust precipitation system at its local mills to cost about $500,000. Headquarters of the company are at 210 South La Salle street, Chicago.

Quarries

The Consolidated Granite Co., Columbia, S. C., has been formed through the merger of the Home Marble and Granite and Columbia Stone companies. The company has been incorporated for $50,000, and manufactures limestone for building and other materials. The officers are: C. Joseph Niggel, president; A. B. Bernasconia, vice-president; Alexander Molinaroli, secretary-treasurer.

The Chestnut Winkler Marble Co., Ocean and Chapel avenues, Jersey City, N. J., has increased its capital stock from $10,000 to $35,000. Frank Rogers is the secretary of the concern.

Ingalls Stone Co., Gosport, Ind., has acquired the holdings of the old Romona Oolitic Stone Co., at Romona and Stinesville, and will reopen the mills and quarries for operation this summer.

Atlas Rock Co., Oakdale, Calif., has been incorporated for $150,000, and is planning to double the capacity of its plant. The company has been operating about four months and is getting out from 12 to 20 cars of gravel, rock and sand per day. With its increased capacity, it expects to turn out a minimum of 40 tons daily. A. C. McMillan, Fresno, is president; A. W. Jones, Fresno, vice-president; Fred C. Beerman, manager, with headquarters at Stockton.

McGregor, Clayton County, Iowa — Anton Huebsch of McGregor has this to say about the development of the crushed stone industry in that section. With a single charge of dynamite, 7500 tons of limestone was brought down—enough to fill 125 or 150 carloads of finished product. The company is furnishing all the rock for the paving at Prairie du Chien, Waukon, Elkader, and Manchester.

The Spring River Stone Co., Carthage, Mo., has been damaged by fire to the amount of $75,000.

The Blake Stone Quarry, Golden, Colo., has been purchased by James Lawrence who will put in a stone crushing plant on the property.

The Granite Dealers Corp. is putting in machinery to double the output of its quarry near Llano, Texas.

The Morrell Vrooman Co., Mohawk, N. Y., has leased the stone quarry of the Southern New York Power and Railroad Corp., at Cullen. The company will, in addition to crushing stone, manufacture limestone. New machinery is being installed. The limestone tests over 90 per cent pure.

Sand and Gravel

The Kickapoo Sand and Gravel Co., west of Peru, Ind., is rapidly approaching completion. The side tracks have been laid, the concrete storage tanks have been completed and the large transformers set. This plant will be one of the largest gravel pumping plants in Indiana.

Seattle Sand and Gravel Co., Leary building, Seattle, Wash., is constructing a wharf and gravel bunker foundation at 9460 Rainier avenue.

McColl & English, Inc., Bennettsville, S. C., will erect a plant at Marlboro with a capacity for 12 to 15 cars of washed gravel per day. D. K. McColl, president; B. M. English, manager.

The Lake Weir Crystal Sand Co., Lake Weir, Fla., Nathan Mayo, president, has purchased the plant of the Lake Weir Sand Co.

The P. K. Dotson Sand and Gravel Co., 2008 Aviation drive, Los Angeles, Calif., is now ready to conduct business. Members of the firm are Kent B. Dotson, William B. Prophet, Aaron A. Couch, and Peter K. Dotson.

The Pekin-Springfield Gravel Co., Pekin, Ill., has just completed a new plant. It is understood that this plant will fill 75 cars of gravel in an 8-hr. day.

The Mercer-Frazer Co., Fortuna, Calif., is now shipping gravel in carload lots. From 500 to 300 yd. of gravel is being hauled daily.

Thogmartin & Gardiner, Iola, Kan., will operate a sand and gravel plant near Iola. Approximately 100 acres has been leased.

Standard Gravel and Material Co., Neosho Rapids, Kan., has been incorporated for $50,000. H. G. Kinsley, president of the Kaw Valley Paving Co., is president; Orville W. Saunders, vice-president and sales manager; Frank Parker, vice-president; Fred Bonebrake, Topeka, Kan., secretary-treasurer; and W. L. Stark, production superintendent.

The Ehernberger Gravel Co., Schuyler, Neb., has purchased and will put into operation a sand and gravel pit just east of Schuyler which will be one of the largest gravel pits in the state. The equipment consists of a 120-hp. oil motor, an 8 and a 6-in. pump, with the necessary piping, couplings, agitating machinery, etc., capable of loading 50 cars of sand and gravel daily.

The Lenawee Sand and Gravel Co., Morenci, Mich., will be in full operation about August 1. Five bins are being built of solid concrete reinforced with steel, three of them being 31 ft. high and two of them, 41 ft. The officers are: Fred C. Livesay, president and manager; Samuel Wilson, vice-president; Ira Ashley, secretary-treasurer. The directors are: Elmer L. Thompson, Fred Livesay, Samuel Wilson, Ira Ashley, W. P. Rainey, and F. J. Blouch.

Lime

The Eagle Rock and Indian Rock Lime Co., New Castle, Va., had its stave and barrel factory destroyed by fire recently.

Northwest Pike Lime Co., Tunnelton, W. Va., has been incorporated by M. M. Bolyard, Newberg, W. Va., I. Wedley Shaffer and L. E. Bolyard, both of Tunnelton.

The Maryland Lime Marl Co., Hagerstown, Md., organized several years ago to develop marl deposits near Benevole, has been dissolved.

The O'Neals Lime Works, Inc., Birmingham, Ala., has appropriated $500,000 for its new plant at Calera, Ala. The installation will include 10 kilns, each having capacity for 40 tons a day; power house, machine shop, crushing and quarry plant. John H. Adams, president; Albert Strafford, secretary-treasurer; Schaffer Engineering and Equipment Co., Pittsburgh, Pa., engineers.

Tiskilwa, Ill.—Limestone marl of good quality has been discovered recently on the farm of Anton Nordstrom, seven miles east of Tiskilwa. The Illinois Agricultural Association pronounces the marl as varying somewhat in different places, the best of it showing a purity of from 88 to 90 per cent as compared with a good grade of crushed limestone.

The C. A. Brockett Cement Co., Kansas City, Mo., has been awarded a contract for a year's supply of lime by the Board of Fire and Water Commissioners, on a bid of $10.90 per ton delivered in carload lots or $15.90 in wagon loads. Freightage on the lime is 11½ cents per 100 lb.

(Continued on page 60)

Silica Sand

The Penn Silicon Co., 825 East Ninth street, Erie, Pa., is a consolidation of the Erie Silicon Products Co. and Karl A. Miller. The company operates quarries at Meadville, Pa., and at Jackson Center, Pa., producing silica sand, glass sand, ganister, and molding loam. It has been incorporated in Pennsylvania for $100,000, and the officers are: George F. Hall, president; J. E. Hall, vice-president; W. M. Graham, secretary-treasurer; and Karl A. Miller, general manager, Meadville, Pa.

Ranger Texas—Secretary of the Chamber of Commerce B. M. Bennett is endeavoring to interest capitalists in a new sand which has been discovered within 5 miles of Ranger. An analysis recently made of this sand by a chemist of the Texas Agricultural and Mechanical College indicates that it is of a superior grade for the manufacture of high-grade glass.

Agstone

Harrisburg, Pa.—Pennsylvania farmers spend $2,000,000 annually for agricultural lime, according to a report from the State Geological Survey. While a large quantity of the lime is obtained from sources in this state, during recent years much has been shipped in from West Virginia and Virginia.

Eaton Rapids, Mich.—Marl with 90 per cent pure lime has been located on four farms in this locality, according to J. Grantham of the soils department of the Michigan Agricultural College, who says it is worth $1 a yard at the pit.

Concrete Products

The Florida New-Tex Brick Co., Tampa, Fla., will establish a branch plant in Miami for the manufacture of concrete brick. The building is now being erected. B. C. Cohn, Tampa, is in charge.

The Western Tile and Marble Co., Pasadena, Calif., has been organized for $50,000. Temporary offices have been opened in 1111 Van Nuys building under the direction of Arnold M. Cannan.

The Prokest Concrete Co., 610 Title Insurance building, Los Angeles, Calif., has been incorporated for $20,000.

Personal

H. H. Hindshaw, a well known rock products geologist and expert of Ann Arbor, Mich., has been made chief engineer of a new cement plant project at Rapid City, S. D.

J. A. Siefert, manager of the Pacific Coast Gypsum Co., Tacoma, Wash., has been appointed district adviser for the Manufacturers' Association of Washington. In this capacity, Mr. Siefert acts as county chairman and maintains contacts between state headquarters of the association and the manufacturing industries of his county.

James A. Hudson has been appointed by the Portland Cement Association as district engineer in charge of a new association office just opened in Memphis in the Exchange building. This office will have charge of association activities in Tennessee. For several years prior to joining the association staff in April, 1919, Mr. Hudson was engaged in engineering and construction work with one of the Southern cement companies and later with the War Industries Board. He has also been connected with the Atlanta office of the association as field representative in Mississippi.

Obituary

H. P. Radley, president and general manager of the Bloomington and Bedford Stone Co., Bedford, Ind., died July 2 after a short illness. He was 68 years old. Mr. Radley for years was one of the leading stone operators of Bloomington and Bedford. He was a director of the Bloomington Chamber of Commerce.

Manufacturers

The Stowe-Fuller Co., the National Fire Brick Co. and the Minor Fire Brick Co., which have for years been engaged in manufacturing and selling fire brick and refractory materials, have lately been consolidated into a single company under the name the Stowe-Fuller Refractories Co., which began operations July 2, 1923, and will conduct the business heretofore carried on by the above-named companies. The Stowe-Fuller Refractories Co. has also acquired a controlling interest in the Federal Refractories Co., manufacturer of silica, magnesite and chrome brick, and will handle the output of the Open Hearth Fire Brick Co., the Zoar Fire Clay Co., the Lock Haven Fire Brick Co. and the Hite Coal & Clay Co. From its various plants and properties the new company will be in a position to supply refractory materials to best advantage from a railroad haul standpoint. The management will continue in the hands of the same officers who have heretofore operated the various properties. Charles B. Stowe is the chairman of the board of directors; Charles E. Kapitzky is the present, Thomas Kemp the first vice-president and operating manager, Joel H. Fuller the second vice-president, and Charles J. Steitz is secretary.

The Terry Mfg. Co., Kearney, N. J., having received an offer from the American Hoist and Derrick Co., of $156,000 for certain assets of the former company, including the plant, machinery and part of its premises, application was made to the district court of New Jersey, on July 19 for an order directing John J. Treacy and George F. Dasco, as receivers to accept the offers of the American Hoist and Derrick Co., and the Holland Co., to authorize the receivers to enter into contracts of sale.

The Vulcan Iron Works, Wilkes-Barre, Pa., have appointed Thomas McLachlan of the home office to be manager of the New York office, Hudson Terminal building, 50 Church street. He is well known among the trade. He will handle the inquiries for locomotives and steel castings as well as all the other lines this company manufactures. M. E. Davis, who had charge of the New York office for a number of years, has gone into other lines of work and is no longer connected with the Vulcan Iron Works.

The Universal Concrete Machinery Co., Peoria, Ill., formerly a partnership, has been incorporated as the Universal Tamping Machine Co., with a capital stock of $50,000. Thomas W. Noble & Co., Chicago, are the exclusive distributors for the Universal line. The principal stockholders are Charles S. Emert, president and general manager; W. H. Jansson, secretary-treasurer; B. J. Lange, vice-president, and Thomas W. Noble, member of board of directors. Contract has been let for the construction of a new and larger factory to properly care for its rapidly expanding business.

The Dorr Co., engineers, 247 Park avenue, New York City, has established a branch office in the First National Bank building, Chicago, and plans to become more intimate with this field than has been possible under the previous method of long-distance work from New York and Denver.

Trade Literature

"An Electric Hoist for Everybody"—This is the title of a 68-page booklet issued by the Shepard Electric Crane and Hoist Co., Montour Falls, N. Y. It is replete with illustrations of the company's "LiftAbout" showing this one-half and one-ton electric hoist as it is used for moving and lifting loads in industry and in business. In cement block manufacturing the company recommends that producers should employ the Lift-About in lifting heavy blocks from forming machines, and that the same efficiency may be carried to the warehouse. The Shepard company also builds electric traveling cranes, transfer, jib, and single I-beam cranes, coal-handling equipment, etc.

"Pneumatic Conveying in Fertilizer Plants" is Bulletin 504 of the Dust Recovering and Conveying Co., Cleveland, Ohio, showing the inside of a boxcar containing fertilizer material being unloaded by the Dracco pneumatic conveying system made by this company. The pneumatic collecting station discharges into distributing cars which again transfer the material to the various points where it is wanted. Two drawings are also shown giving the details of the system.

Correction—In the advertisement of the Celite Products Co., in ROCK PRODUCTS for July 14, page 7, it was stated that "In a kiln producing 80 tons per day, the actual fuel consumed is 10 per cent, or 8 tons. Out of the total fuel input, Richard K. Meade, authority on lime plant construction, estimates that 17 per cent is lost by radiation from the shell—1.35 tons utterly wasted." It should have read: "In a kiln producing 80 barrels per day, the actual fuel consumed is 25 per cent or 1.85 tons. Out of the total input, Richard K. Meade . . . estimates that 17 per cent is lost by radiation from the shell—.315 tons is utterly wasted."

Palisades Park Commission May Enter Crushed-Stone Business

AFTER years of litigation, during which the Palisades Park Commission of New York and New Jersey succeeded in closing up all the trap rock quarries along the Hudson river above New York City, the commission's chief engineer, W. A. **Welch**, comes forward with a plan to spend $5,000,000 quarrying some of this rock and selling it to pay the expense of projected park developments. According to the New York *Times*:

"A proposal of the Palisades Interstate Park Commission to remove the greater part of Hook Mountain, and establish in its place a beautiful playground, like Bear Mountain Park, was disclosed recently to Governors Smith of New York and Silzer of New Jersey.

"A committee of the Park Commissioners has been working on the plan for almost a year. Sanction of the New York state legislature to proceed with the work will be asked at its next session, according to Major W. A. Welch, chief engineer of the Interstate Commission.

"Hook Mountain is one of the highest peaks on the west shore of the Hudson river just below Haverstaw. Its 4½ miles of trees and foliage are bitten into by deep quarries, defacing much of the mountain's beauty. The commission plans to remove the remaining portion of the mountain as far inland as the deepest excavation, rounding it out to restore it to its former natural state.

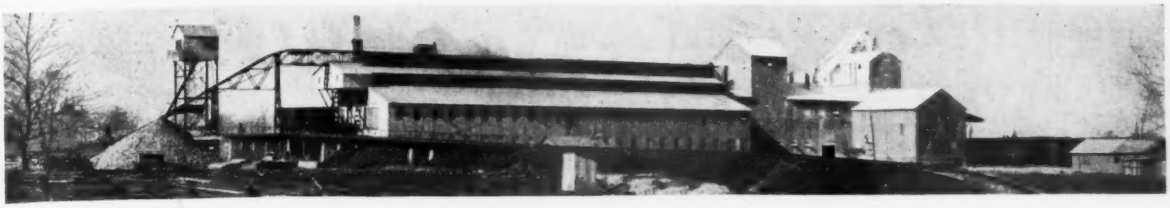
"This will entail the removal of 10,000,000 cu. yd. of rock, according to Major Welch. He figured that the quarrying would cost no more than $5,000,000, which might be defrayed by the sale of the rock of which the mountain is made.

"The governor said he would advocate the passage of a bill in the legislature which would permit the commission to proceed with the work. The engineer said it would take about seven years to complete it."

The big crushing plant of the New York Trap Rock Co. at Rockland Lake has never been dismantled, although it was closed by the Palisades Park Commission about three years ago.

P. S. From other sources we are told this "story" is pure "bunk;" so it is printed merely for what it appears to be—an interesting possibility. The pretex for stopping work on this quarry was that the mountain was being ruined from an esthetic point of view.—THE EDITOR.

IN 1912 the quantity of permissible explosives consumed in the United States represented about 5 per cent of the total quantity of all kinds of explosives produced in this country, while in 1922 it was 10.1 per cent. These figures are according to W. W. Adams, Bureau of Mines.



General view of plant of Ohio Hydrate & Supply Company

A Raymond Installation

One of the three Raymond Pulverizers is shown to the left and back of the Schaffer Hydrator

Twenty-five cents a ton is the total cost, including depreciation, interest, power, repairs and labor, to the Ohio Hydrate and Supply Company using Raymond Pulverizers, which takes their lime from the hydrator, grinds and air separates it, and delivers the finished product to the storage bin.

This concern installed the first two machines in their initial plant in 1917 and added a third during 1920. The three machines produce 14 tons per hour and operate 24 hours a day, 306 days a year.

Raymond Pulverizers equipped with Air Separation, do three things in handling the lime between the Hydrator and finished product bin.

FIRST:—They beat up the lime, distributing the moisture more evenly throughout, and tending to complete hydration—

SECOND:—This beating action separates the impurities like core, sand, and unburnt lime, eliminating them from the beater chamber through a throwout attachment—

AND THIRD:—The ground material is classified into a fine powder and delivered direct to a storage bin without dust or the use of an elevator.

Raymond Equipment will perform the same for you, producing a finished material in the best possible condition for use in both the building and chemical industries as well as for agricultural purposes.

You will find the cost per ton far less than by the use of screens or any other method and you will have a superior product to market.

Raymond Bros. Impact Pulverizer Co.

1301 N. BRANCH ST. CHICAGO, ILL.

Eastern Office, 50 Church St., NEW YORK CITY
Western Office, 1002 Washington Bldg., LOS ANGELES

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

Air Compressors
Pennsylvania Pump & Compressor Co., Easton, Pa.
Smokeless Oil Burner Co., Bucyrus, Ohio
Worthington Pump & Mchy. Corp., New York

Air Separators
Rubert M. Gay Co., New York, N. Y.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mchy. Co., Kingston, N. Y.

Augers
Howells Mining Drill Co., Plymouth, Pa.

Automatic Weighers
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Bags and Bagging Machinery
Jaite Co., Jaite, Ohio
Valve Bag Co. of America, Toledo, Ohio

Balls (Tube Mill, etc.)
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Worthington Pump & Mchy. Corp., New York

Belting
New York Belting & Packing Co., New York City

Belt Fasteners and Hooks
Crescent Belt Fastener Co., New York City

Belt Lacing and Rivets
Crescent Belt Fastener Co., New York City

Bins and Bin Gates
Austin-Western Road Machinery Co., Chicago, Ill.
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Boiler Insulation
Celite Products Co., Chicago, Ill.

Boilers (Return and Water Tube)
Jackson & Church Co., Saginaw, Mich.

Box Car Loaders
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Brick Machinery
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Jackson & Church Co., Saginaw, Mich.
Shope Brick Co., Portland, Ore.

Buckets (Elevator and Conveyor)
American Manganese Steel Co., Chicago Heights, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, Ohio
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Buckets (Grab, Clamshell, etc.)
Browning Co., Cleveland, Ohio
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Orton & Steinbrenner, Chicago, Ill.
Penn Fdy. & Mach. Co., Reading, Pa.

Burr Mills
J. B. Ehrsam & Sons, Mfg. Co., Enterprise, Kan.

Cableways
Interstate Equipment Corp., New York, N. Y.

Calcining Kettles (Gypsum)
American Process Co., New York, N. Y.
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kan.

Car Pullers
Ottumwa Box Car Loader Co., Ottumwa, Iowa
Thomas Elevator Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Cars (Quarry)
Penn Fdy. & Mach. Co., Reading, Pa.

Chain (Steam Shovel)
Carroll Chain Co., Columbus, Ohio

Chain Drives
Morse Chain Co., Ithaca, N. Y.

Coal Pulverizing Equipment
Fuller-Lehigh Co., Fullerton, Pa.
Rubert M. Gay Co., New York, N. Y.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

Conveyors and Elevators
Austin-Western Road Machinery Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
Link-Belt Co., Chicago, Ill.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
W. Toepfer & Sons Co., Milwaukee, Wis.
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.

Couplings
Knox Mfg. Co., Philadelphia, Pa.

Cranes (Crawler)
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Cranes (Locomotive)
American Hoist & Derrick Co., St. Paul, Minn.
Browning Co., Cleveland, Ohio
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, Ohio
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Cranes (Overhead Electric Traveling)
Morgan Engineering Co., Alliance, Ohio

Crushers (Hammer)
Jeffrey Mfg. Co., Columbus, Ohio
Pennsylvania Crusher Co., Philadelphia, Pa.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Austin-Western Road Machinery Co., Chicago, Ill.
Earle C. Bacon, Inc., New York, N. Y.
C. G. Buchanan Co., New York City
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kan.
Rubert M. Gay Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City.
Morgan Engineering Co., Alliance, Ohio
New Holland Machine Co., New Holland, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo. (Jaw)
Worthington Pump & Mchy. Corp., New York

Crushing Rolls
C. G. Buchanan Co., New York City
Kennedy-Van Saun Mfg. & Engineering Corp., New York
McLanahan Stone Mach. Co., Hollidaysburg, Pa.
New Holland Machine Co., New Holland, Pa.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York

Derricks
McMyler Interstate Co., Cleveland, Ohio
Thomas Elevator Co., Chicago, Ill.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co., Chicago Heights, Ill.
Marion Steam Shovel Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Draglines
Erie Steam Shovel Co., Erie, Pa.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio

Dragline Cableway Excavators
Browning Co., Cleveland, Ohio
Sauerman Bros., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Dredge Chain
Carroll Chain Co., Columbus, Ohio

Dredges (Hydraulic)
Ellicott Machine Corp., Baltimore, Md.

Dredges (Sand and Gravel)
American Manganese Steel Co., Chicago Heights, Ill.
Ellicott Machine Corp., Baltimore, Md.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Morris Machine Works, Baldwinsville, N. Y.
Thomas Elevator Co., Chicago, Ill.

Drills (Air and Electric)
Howells Mining Drill Co., Plymouth, Pa.

Drills (Blast Hole)
Howells Mining Drill Co., Plymouth, Pa.
Sanderson-Cyclone Drill Co., Orrville, Ohio

Drills (Hand)
Howells Mining Drill Co., Plymouth, Pa.

Drill Steel
Colonial Steel Co., Pittsburgh, Pa.

Dryers
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Process Co., New York, N. Y.
Buckeye Dryer Co., Chicago, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Kennedy-Van Saun Mfg. & Engineering Corp., New York, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

Engineers
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Robt. W. Hunt Co., Chicago, Ill
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
F. L. Smidth & Co., New York, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

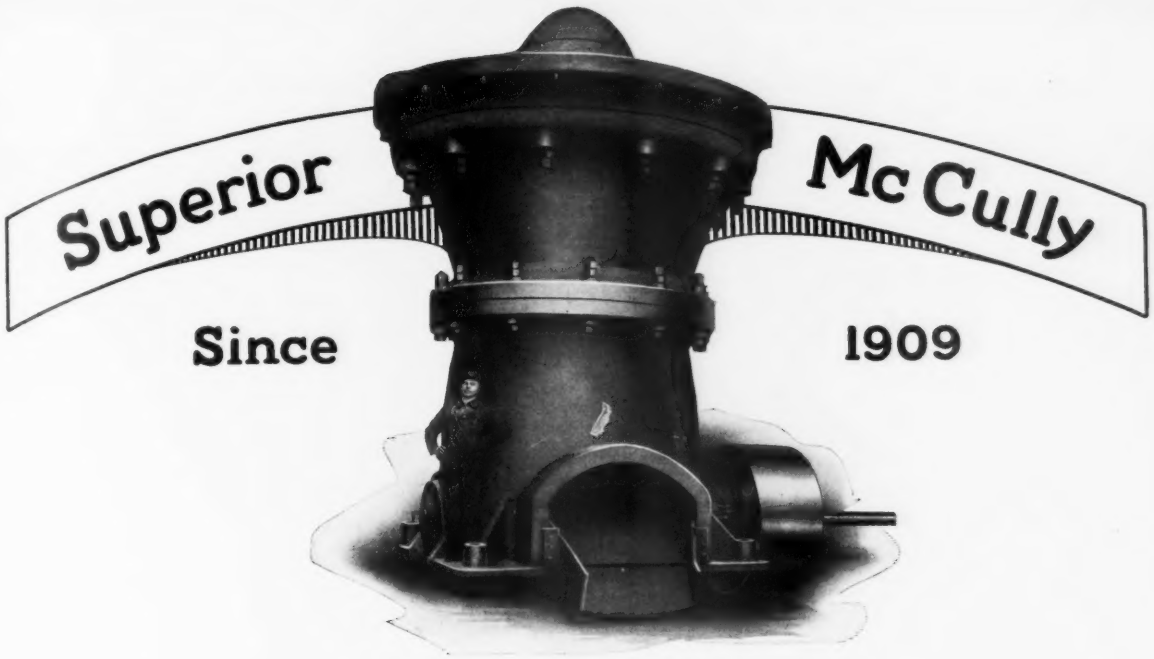
Engines (Gasoline, Kerosene and Oil)
American Hoist & Derrick Co., St. Paul, Minn.
Climax Engineering Co., Clinton, Iowa.
Worthington Pump & Mchy. Corp., New York

Engines (Steam)
American Hoist & Derrick Co., St. Paul, Minn.
Ellicott Machine Corp., Baltimore, Md.
Jackson & Church Co., Saginaw, Mich.
Morris Machine Works, Baldwinsville, N. Y.

Frogs and Switches
Central Frog & Switch Co., Cincinnati, Ohio

Fuses (Detonating and Safety)
Ensign-Bickford Co., Simsbury, Conn.

Gas Producers
Chowning Regulator Corp., Corning, N. Y.
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Morgan Construction Co., Worcester, Mass.



Worthington Built
The Original Superior McCully

In 1909 Worthington built the first short shaft gyratory called the Superior McCully Crusher as distinguished from the standard McCully. Thus the present style of gyratory crusher built at the Power and Mining Works of the Worthington Pump and Machinery Corporation has a background of fourteen years.

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Harrison, N. J.
Laidlaw Works, *Cincinnati, Ohio.*

Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works
Cudahy, Wis.
Snow-Holly Works
Buffalo, N. Y.

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

Gas Producer Regulators
Chowning Regulator Corp., Corning, N. Y.

Gears (Spur, Helical, Worm)
Link-Belt Co., Chicago, Ill.

Grizzlies
Robins Conveying Belt Co., New York City
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.

Gypsum Plaster Plants
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kans.

Hoists
American Hoist & Derrick Co., St. Paul, Minn.
Hyman-Michaels Co., Chicago, Ill.
Industrial Works, Bay City, Mich.
Jackson & Church Co., Saginaw, Mich.
Link-Belt Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

Hose (Water, Steam, Air Drill)
New York Belting & Packing Co., New York City

Hydrators (Lime)
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Insulation (Heat)
Celite Products Co., Chicago, Ill.

Kilns (Rotary)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
H. Miscampbell, Duluth, Minn.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

Kilns (Shaft)
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Lime Handling Equipment
H. W. Caldwell & Son, Chicago, Ill.
Kritzer Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
H. Miscampbell, Duluth, Minn.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Sturtevant Mill Co., Boston, Mass.
Webster Mfg. Co., Chicago, Ill.

Lime Kilns
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.

Liquid Fuel Equipment
W. N. Best Furnace & Burner Corp., New York City

Loaders and Unloaders
Hoar Shovel Co., Duluth, Minn.
Jeffrey Mfg. Co., Columbus, Ohio
Link-Belt Co., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Locomotives (Steam, Gas and Elec.)
Baldwin Loco. Wks., Phila., Pa. (Steam)
Davenport Locomotive Works, Davenport, Iowa (Steam, Gas)
Fate-Root-Heath Co., Plymouth, Ohio (Gas)
Ironton Eng. Co., Ironton, Ohio (Elec.)
Jeffrey Mfg. Co., Columbus, Ohio (elec.)
Lima Locomotive Works, Lima, Ohio (Steam)
Milwaukee Loco. Mfg. Co., Milwaukee, Wis. (Gas)
H. K. Porter Co., Pittsburgh, Pa. (Steam)
Vulcan Iron Works, Wilkes-Barre, Pa. (Steam)

Lubricating Systems
Keystone Lubricating Co., Philadelphia, Pa.
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Manganese Steel (Castings, Repairs, etc.)
American Manganese Steel Co., Chicago Heights, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio

Magnetic Devices
Magnetic Mfg. Co., Milwaukee, Wis.

Mills, Grinding (Ball, Tube, etc.)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Jackson & Church Co., Saginaw, Mich.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
F. L. Smidth & Co., New York, N. Y.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Worthington Pump & Mchy. Corp., New York

Motors and Generators
Burke Electric Co., Erie, Pa.

Oil Burners and Systems
Smokeless Oil Burner Co., Bucyrus, Ohio

Packing (Pump Valves, etc.)
New York Belting & Packing Co., New York City

Perforated Metal
Cross Engineering Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
W. Toepfer & Sons Co., Milwaukee, Wis.

Portable Conveyors
Jeffrey Mfg. Co., Columbus, Ohio

Portable Engines
Climax Engineering Co., Clinton, Iowa
Evinrude Motor Co., Milwaukee, Wis.

Power Units
Climax Engineering Co., Clinton, Iowa

Pulverizers
Fuller-Lehigh Co., Fullerton, Pa.
Jeffrey Mfg. Co., Columbus, Ohio
K-B Pulverizer Co., Inc., New York City
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Crusher Co., Cedar Rapids, Iowa

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
Ellicott Machine Corp., Baltimore, Md.
Evinrude Motor Co., Milwaukee, Wis.
Morris Machine Works, Baldwinsville, N. Y.

Pumps (Water, etc.)
Evinrude Motor Co., Milwaukee, Wis.
Morris Machine Works, Baldwinsville, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Smokeless Oil Burner Co., Bucyrus, Ohio
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York

Road Machinery
Austin-Western Road Machinery Co., Chicago, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Marion Steam Shovel Co., Marion, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Universal Road Mchy. Co., Kingston, N. Y.

Scrapers (Drag, etc.)
Austin-Western Road Machinery Co., Chicago, Ill.
Northwest Engineering Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Screens
Austin-Western Road Machinery Co., Chicago, Ill.
Earle C. Bacon Co., New York, N. Y.
Cross Engineering Co., Carbondale, Pa.
Rubert M. Gay Co., New York, N. Y.
Harrington & King Perforating Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
Link-Belt Co., Chicago, Ill.
McLanahan Stone Mach. Co., Hollidaysburg, Pa.
Newark Wire Cloth Co., Newark, N. J.
Robins Conveying Belt Co., New York City
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.
W. S. Tyler Co., Cleveland, Ohio
Universal Crusher Co., Cedar Rapids, Iowa
Weller Mfg. Co., Chicago, Ill.

Screens (Electric Vibrating)
W. S. Tyler Co., Cleveland, Ohio

Separators (Magnetic)
Magnetic Mfg. Co., Milwaukee, Wis.

Shafting
H. W. Caldwell & Son, Chicago, Ill.

Shovels (Steam, Gas and Electric)
Browning Co., Cleveland, Ohio
Erie Steam Shovel Co., Erie, Pa.
Hoar Shovel Co., Duluth, Minn.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Sprockets and Chain
American Manganese Steel Co., Chicago H'ts, Ill.
H. W. Caldwell & Son, Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio

Steel Plate Construction
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Hendrick Mfg. Co., Carbondale, Pa.
Jackson & Church Co., Saginaw, Mich.

Testing Sieves and Shakers
Newark Wire Cloth Co., Newark, N. J.
W. S. Tyler Co., Cleveland, Ohio

Tool Steel
Colonial Steel Co., Pittsburgh, Pa.

Track Equipment
Central Frog & Switch Co., Cincinnati, Ohio

Tramways (Aerial Wire Rope)
Interstate Equipment Corp., New York City
A. Leschen & Sons Rope Co., St. Louis, Mo.

Transmission Machinery
H. W. Caldwell & Son, Chicago, Ill.
Kritzer Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Underground Loaders
Hoar Shovel Co., Duluth, Minn.

Valves (Throttle)
Knox Mfg. Co., Philadelphia, Pa.

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
McLanahan Stone Mach. Co., Hollidaysburg, Pa.
Smith Engineering Works, Milwaukee, Wis.

Weighing Equipment
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Welding Equipment
Burke Electric Co., Erie, Pa.

Wire Cloth
Twin City Iron & Wire Works, St. Paul, Minn.
W. S. Tyler Co., Cleveland, Ohio

Wire Rope
A. Leschen & Sons Co., St. Louis, Mo.

Hoar Shovels Rushing Tunnel Work in New Jersey

PUBLIC WORKS
CITY COUNTY STATE
A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"
Vol. 54 June, 1923 No. 6

PROGRESS ON THE WANAQUE PROJECT

In driving the Great Notch Tunnel full use is made of the most up-to-date labor-saving machinery. Description continued from the May issue.

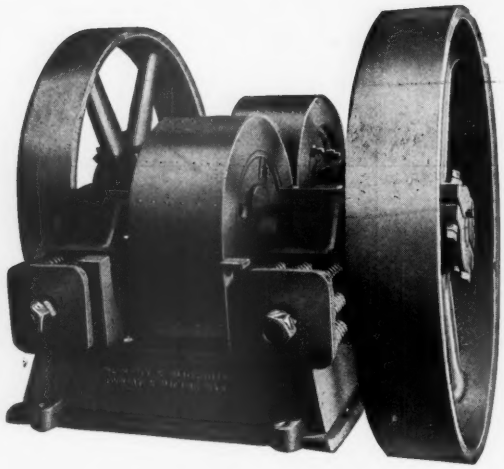
RIVER CONTROL CONDUIT

The contractor for the tunnel is Heyman & Goodman, of Jersey City. The total of the itemized bids used as a basis of awarding the contract was $918,267.

Owing to the small size of the tunnel, only about 9 feet high and wide, the entire heading is blown at once. Twenty holes are driven in the heading, using three Water-Leyner drills. The holes are charged with six pounds of Atlas 60% powder per cubic yard and are fired in six successive shots. Drilling is performed in two shifts, and after firing at the end of each shift, the mucking is performed.

For mucking, the contractor is using a Hoar mechanical shovel, which is found to work satisfactorily in this small tunnel.

The tunnel work has progressed at the following rates, in lineal feet of tunnel, per week: For the week ending April 14, 44 feet; April 21, 57 feet. (Hoar Shovel first went into operaton on April 19th. Note increased footage); April 28, 69 feet; May 5, 79 feet; May 12, 74 feet; May 19, 73 feet; May 26, 74 feet; June 2, 69 feet. Prior to April 7 about 450 feet had been tunneled.

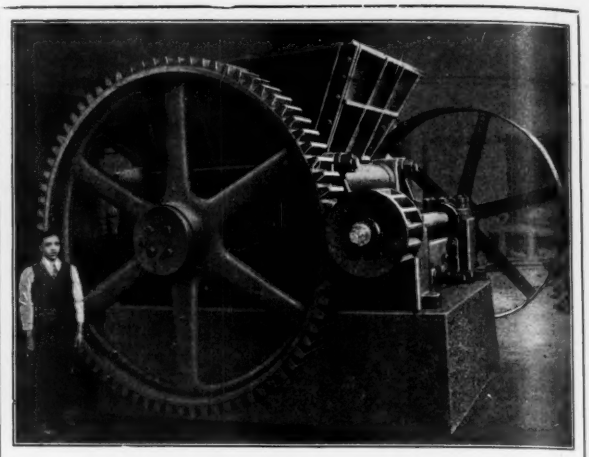


CRUSHERS—

Webb City & Carterville crushers, screens, elevator buckets, or transmission equipment have conspicuously demonstrated their superiority wherever they have been installed.

Write for Descriptive Circular

WEBB CITY & CARTERVILLE FOUNDRY & MACHINE WORKS
WEBB CITY, MISSOURI

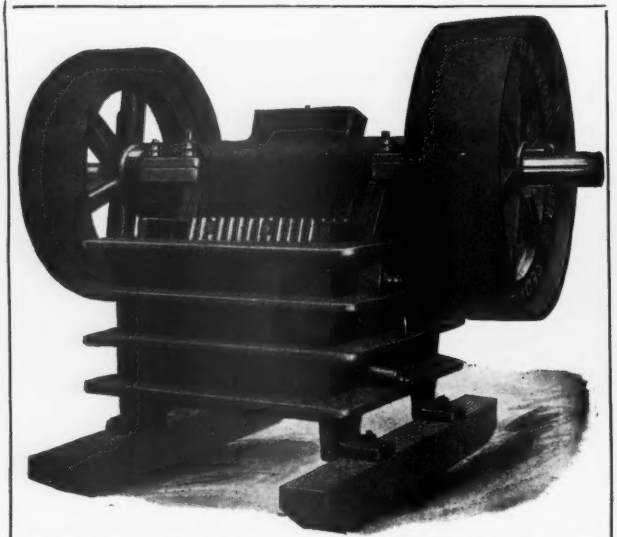


If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.
Screens, Elevators, Conveyors, Rock Washers, Etc.



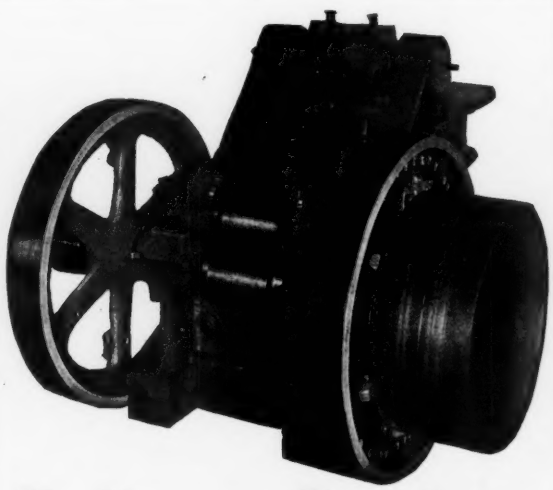
UNIVERSAL STEEL LINE

THE PERFECT GRAVEL AND REJECTION CRUSHER

Sizes up to 8"x36". Capacities 20 to 200 tons daily. Crushes to ¾" and finer if desired. Has no superior for FINE CRUSHING and UNIFORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

UNIVERSAL CRUSHER CO.
225 Third Street Cedar Rapids, Iowa, U. S. A.



Reliance Crushers

IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.
Branches in all principal cities in U. S. and Canada
MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT

OSGOOD ¾ yd. H. D. Clamshell Handling Screenings

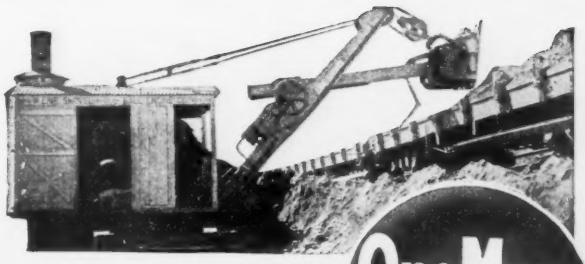
OSGOOD
Revolving Steam Shovels

Will solve your material handling problems. Can be used as a Clamshell, Dragline or Crane—a real general utility machine. Speedy, economical in operation and upkeep, and strong enough to withstand severe usage.

See an OSGOOD at work

¾ and 1 Yd. Revolving types.
½ to 6 Yd. Railroad types.
Ask for Descriptive Bulletin.

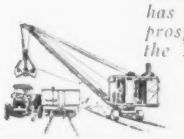
The OSGOOD Company
Marion, Ohio, U. S. A.



One Man; 350 Tons

When you require an output of 800 to 1,000 tons of sand or gravel per day, a fireman is needed in addition to the steam shovel operator. But when you are getting out 350 tons a day, or less, one man can often both operate and fire an ERIE Shovel. The Cumberland Sand Co., of Cumberland, Md., write us:

"Our labor cost is only a trifle; one man operates and fires our ERIE *and keeps it in repair. The saving of labor means more efficiency, and our output has increased considerably. To any prospective purchaser, we recommend the* ERIE."—**A. K. Smith, Manager.**



Every ERIE Shovel easily and quickly changed over to Locomotive Crane to handle clamshell bucket.

The ERIE is very strongly built; gives steady service in hard work. Its output compares VERY FAVORABLY with that of much larger and more costly shovels. We will be glad to send you a bulletin showing just what the ERIE Shovel can do. Write for Bulletin P-16.

Erie Steam Shovel Co., Erie, Pa., U. S. A.
Builders of ERIE Steam Shovels and Locomotive Cranes

ERIE Revolving Shovels ERIE Steam Shovels

Flirting With the Shovels

In the game of crushed stone quarrying a drill that is within flirting distance with steam shovel or the loading gangs is in a dangerous position. A breakdown on the drill, and the whole production schedule is upset.

No. 14 Cyclone Drills, on the job, always keep plenty of stone ahead, and if they should ever be crowded there is no need for worry—the working parts are cast steel, reducing to the very minimum all possibility of breakdowns.

Write for "Big Blast Hole Drills," a semi-technical treatise on quarry drilling and also containing a complete description of Cyclone No. 14 Big Blast Hole Drills.

The Sanderson-Cyclone Drill Co.
Orrville, Ohio
Eastern and Export Office: 30 Church Street, New York City

Are you using inefficient or out-of-date material handling equipment?

Industrial Cranes

In thousands of installations are proving successful in reducing material handling costs, with greatly increased production.

One INDUSTRIAL is available for operating with clamshell or dragline bucket, hook and block for weighty unit lifts; with attachments for steam shovel and pile driving operations.

Surely no single machine is equal to so many different jobs.

SAVE THOSE WAGES WITH INDUSTRIALS.
Have you a copy of our Golden Anniversary Catalog?

Industrial Works, Bay City, Michigan
New York Chicago Philadelphia Detroit
SALES ENGINEERS IN ALL PRINCIPAL CITIES
1873 BUILDERS OF CRANES FOR 50 YEARS **1923**

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

FOR SALE

5 5x6x7x110′ Rotary KILNS.
5 5x21′ Tube Mills (1 has Silax Lining, 3 Steel Lining, 1 without Lining).
2 No. 8 Ball Mills.
1 4x40′ Coal Dryer.
1 No. 6 Gates Crusher.
2 5½x22′ Smidth Tube Mills.
2 No. 66 Smidth Kominuters.
2 6x60′ Rotary Dryers.
1 Lathe, 26″ Swing, 16′ Bed.
2 Automatic Weighing Machines.
3 Roll Leather Belting, 3-ply, 46″x 242′. And lot of Miscellaneous Equipment.

ENGINEERING SALES COMPANY
Stockertown, Pa.

1—50-ton standard gauge Brooks 6-wheel switcher.
1—28-ton standard gauge Shay geared locomotive.
2—10x16″ 36″ gauge 4-wheel saddle tank locomotives.
2—9x14″ 36″ gauge 4-wheel saddle tank locomotives.
1—14-B Bucyrus steam shovel, mounted on traction wheels.
2—18-ton O&S bucket handling locomotive cranes.
10 Miles 30-lb. and 35-lb. relay steel rails, Natalbany, La.

Birmingham Rail and Locomotive Co.
Birmingham, Ala.

For Sale—Heavy Equipment

Shovel, 95 C Bucyrus, R. R., 2½ yd.
Crane & Dragline Austin No. 5 Gas Caterpillar
Loco. Crane, O. & S., 22 ton; new 1921—with drag and clam bucket.
Gondola cars, 20-80,000 cap. A. R. A.
Pit Hoist, 75 HP.; D. C.; 48x40 drum; electric
Osgood 18 and 29 Caterpillar Shovels; new

VICTOR EQUIPMENT CO.
40 North Dearborn Street Chicago, Illinois

FOR SALE

One new 6 ft. x 6 ft. x 10 ft. Patch Gang Saw, complete with pump.

Address Box 1677, care of Rock Products 542 South Dearborn St., Chicago, Illinois

---

Used Crusher Bargains

36-in. Symons Disc, lot extra parts	$2200
Two No. 4 Williams Jumbo, 24x28½ in., each	1550
No. 5 McCully Gyratory	1650
No. 5 Champion Jaw Crusher	900

Locations and details on request

CHARLES EARL CURRIE & CO.
Ashland, Alabama

FOR SALE

One 6 by 8 Sturtevant Newaygo Separating Screen, all complete.
One Ring Single Roll Crusher in first-class condition.
Full information on request. Address

P. O. Box 1682, Care Rock Products
542 South Dearborn Street, Chicago, Illinois

2—7½D Gates Gyratory Crushers; regular drive; manganese fitted; first class condition; immediate shipment
3—150 HP. Kewanee Fire Box Boilers; 125 lb. pressure, in Indiana

ARTHUR S. PARTRIDGE
415 Pine St. St. Louis

Wanted—Steam Shovel

About 1 yd. dipper, traction or caterpillar. Consider purchase. Must be first class condition, and bargain price, otherwise not interested. Submit complete specifications.

International Silica Company
Cairo, Ill.

CRUSHER

One 24x48 Buchanan Jaw, Manganese Fitted, in best of condition ready to ship from Jersey City, New Jersey, at one-third new price, including large quantity of brand new spare parts.

T. H. Letson Company
46 Church Street New York City

FOR SALE

1—6K Gates Crusher
1—4B Gates Crusher
15—4½ to 5 ton steel body, end dump, heavy duty standard gauge quarry cars, new, 1922
1—Switching Locomotive, standard gauge
1—70 ton Steam Shovel, 2½ yd. bucket
Will sell any or all at very low prices

Inland Crushed Stone Co.
105 North Clark St. Chicago, Ill.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.
Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

3—6x24 ft. Heavy Duty Tube Mills, silex lining, unused.

Address
Box 1680, care of Rock Products
542 S. Dearborn St., Chicago, Ill.

For Sale—STEAM SHOVEL

⅝ YD. THEW "O" TRACTION

Thoroughly rebuilt; attractive terms for quick sale.

Walter A. Zelnicker Supply Co., St. Louis
Rails, Locomotives, Cars, Tanks, Pipe

For prompt and satisfactory results in buying or selling a plant securing help or a position, use the Classified Department of ROCK PRODUCTS

Used Equipment

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ROTARY DRYERS

30 New Direct Fired Rotary Dryers

4 ft. 0 in. diameter, 30 ft. long

These Dryers were about to be put into operation as the Armistice was signed, and consequently were never used. We are offering them at a sacrifice, complete with driving mechanism, furnace irons, grates, etc. Some are equipped with steam radiators for steam heated air drying.

McDERMOTT BROS CO.
Allentown, Penna.

FOR SALE

3—No. 6 McCully Gyratory Crushers, Manganese fitted, in first class operating condition.

The Equipment Sales Co.
Nashville, Tennessee
"If we don't have it we will get it."

SPECIAL BARGAINS

Send Us Your Boiler Inquiries

66x86 in. TRAYLOR JAW CRUSHING PLANT.
25-50-80-110 HP. Elec. Hoists.
Nos. 4-5-6-7½-9 and 10 CRUSHERS.
6 and 10 ton Gasoline Locomotives.
2-DISC CRUSHERS, 24, 28 and 36 in.
100 TON 2½ yd. ELECTRIC SHOVEL.
50-5000 ft. Steam Belt and Electric Compressors.
13x30 in.; 10x18 in.; 8x14 in. JAW CRUSHERS.
24x54 McLANAHAN ROLL CRUSHERS.
50 HP. D. D. HOIST, 440 V., 3 Ph. Motor Dragline Set; Also 25 HP. Dragline Equip.
150 HP. LOCO. TYPE BOILER, 125 lb.
3 60-HP. GASOLENE S-D HOISTS, PRAC. NEW.
10 and 12 ton ROAD ROLLERS.
5-7½ and 10 HP. PORTABLE CONVEYORS.
750-1000 GPM. UNDERWRITERS STEAM PUMPS.
NEW No. 5 GYRATORY CRUSHER (MICHIGAN).

Send Us Your Inquiries for Your Wants
ROSS POWER EQUIP. COMPANY
Indianapolis, Ind.

Mine Cars, Rails and Locomotives

We have a number of good, serviceable, standard gauge, second hand locomotives, and narrow gauged ones, for immediate shipment.

M. K. FRANK
Frick Building Pittsburgh, Pa.

FOR SALE

1—4½'x30' American Process Dryer.
1—10½" x 12" Brown, Double Drum Steam Hoist.

Consolidated Products Co.
15 Park Row, New York City

Erie Pump Bargain

New, never used, 8 inch heavy duty. Write for bargain price.

STROUD & CO.
Omaha, Nebr.

FOR SALE

4000 lin. ft., 30-in., 20 lb. Track
12 30-in., 1½-yd. Cars
PLYMOUTH GASOLINE LOCOMOTIVE

F. WILLIAM STOCKER
Hoboken, N. J.

WANTED

1—1 yd. Dragline Bucket.

Breen Stone & Marble Co.
Kasota, Minn.

WANTED

Steam shovel, Railroad type, 2½ yd. dipper. Prefer Bucyrus or Marion.

HOLSTON QUARRY CO.
Strawberry Plains, Tenn.

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

STONE LAND FOR SALE OR LEASE

Over 400 acres of fine white limestone, light stripping, and nearly all covered with fine black dirt. 1,160 ft. of R. R. frontage on the Indiana Harbor Belt Railway. High tension wires of 33,000 volts extend the full length of this property supplying all power and light necessary. Twelve miles from loop in Chicago. Fine stone roads for autos or trucks to all parts of the city.

H. A. STODDARD
R. F. D. ROUTE 2 PHONE LA GRANGE 548 LA GRANGE, ILL.

FOR SALE

High grade argillaceous limestone deposit in commercial quantities in central Illinois. No competition.

Address Box 1686, Care of Rock Products
542 So. Dearborn St., Chicago, Ill.

WANTED

Steam shovel engineer and cranesman for quarry work, central New York state. Bucyrus 70-C. State experience and wages expected and also concerns for whom you have worked. Prompt answer.

P. O. Box 773, Albany, N. Y.

WANTED

Quarry superintendent, one who understands drilling, blasting and steam shovel operation, for stone-crushing plant, 1000 tons capacity, quarry equipped with blast-hole drill, 2 tripod drills, 6 plug drills, 2 steam shovels. Man must have experience and references; good salary, and interest in business for the right man.

Address Box 1691, care Rock Products
542 South Dearborn Street Chicago, Illinois

FOR SALE

Complete sand and gravel plant. Present capacity four hundred tons per day. An ideal deposit, excellent in quality, deep, and forty acres in extent. Railroad and trucking deliveries. Address

Box 1683, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

Experienced Manager

Open pit or underground quarry superintendent or manager open for employment August 1. Fifteen years' experience. Best references. Nominal salary with share in profits produced.

Address Box 1678, care of Rock Products
542 South Dearborn Street Chicago, Illinois

POSITION WANTED

First class executive of long experience in erection and operation of stone crushing and sand plants seeks connection with proposition of merit as manager or superintendent; original ideas for production; references. Address

Box 1688, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

POSITION WANTED

As superintendent or general foreman of quarry and crusher plant, practical experience. Address

Box 1687, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

Business Opportunity

Parties owning a very large and valuable deposit of high grade rock-gypsum or alabaster, desire to secure capital and experienced management to organize a company for its development. For further particulars address

Box 1679, care of Rock Products
542 South Dearborn Street Chicago, Illinois

WANTED

Superintendent for Lime and Stone Crushing Plant located at Logansport, Indiana.

Address

The Logansport Stone & Lime Co.
Huntington, Indiana

Situation Wanted

Manufacturing executive, thoroughly experienced in limestone products, structural steel fabrication and construction and the manufacture of paper, desires to make a permanent connection as manager, superintendent, secretary or similar capacity, with responsible concern. Address

Box 1690, care of Rock Products
542 South Dearborn Street Chicago, Illinois

Position Wanted

as Manager, General Superintendent or other position of responsibility. Long, practical experience with large operations in both construction and operation. Intimate acquaintance with most types of machinery, both plant and quarry. Good mechanical and executive ability. Address

Box 1681, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

POSITION WANTED

Cement plant engineer, as general manager or general superintendent of cement plant or plants. Wet or dry process. Long experience in design, construction, remodeling and operation. At present superintendent of a wet process plant. Desires change for greater responsibilities. University graduate, M. E. Married, age 49. References exchanged. If interested in a live wire, address

Box 1689, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

POSITION WANTED

An experienced cement manufacturer, technically and commercially trained in all details of financing, operating and selling, desires suitable connection. If interested full information will be furnished.

Address P. M. 200, care Rock Products
542 South Dearborn Street Chicago, Illinois

WANTED

Personal assistant to operating engineer, technical graduate preferred, experienced in position of some authority with quarry and stone-crushing or similar operations. Give full experience and salary desired. Address

Box 1674, care of Rock Products
542 South Dearborn Street Chicago, Illinois

WANTED, POSITION

as general superintendent or manager, by a man with a life experience in the lime industry. Competent to take full charge of operations. Prefer connection with a company where ability to produce results would secure advancement. Excellent references. Location anywhere. Address

Box 1684, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

POSITION WANTED

By energetic quarry supt. of wide experience, and during the last eight years have been manager of one of the largest and most diversified rock propositions in the middle west. The applicant is familiar with the business as well as the quarry and mechanical end. I do not claim to be an expert or know it all, but at the same time I will exercise my best efforts, and when affiliated the firm's interest becomes my own. Recommendations and references furnished. Address

Box 1685, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

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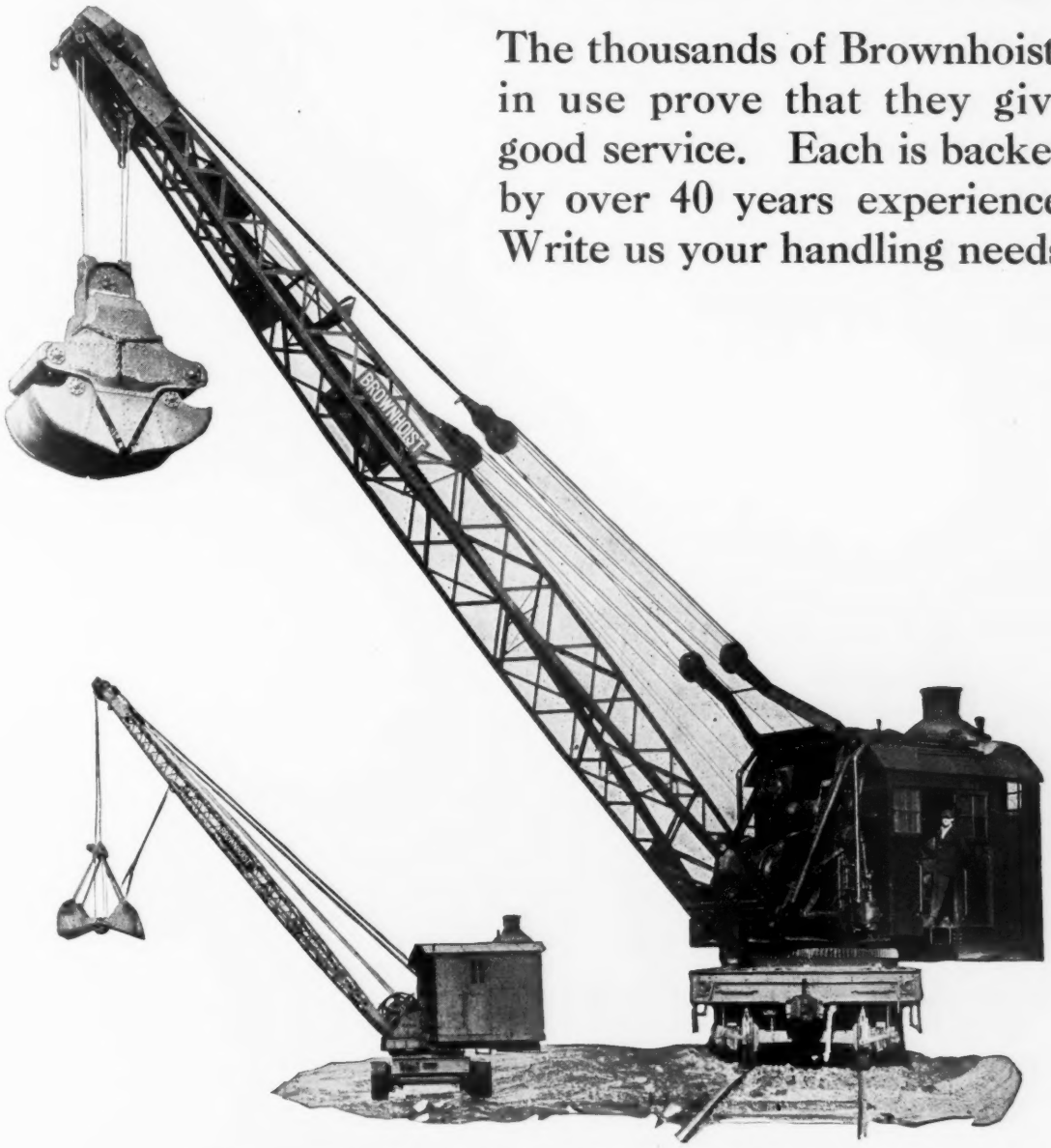
Small Creeper Cranes or Big Cranes



The thousands of Brownhoists in use prove that they give good service. Each is backed by over 40 years experience. Write us your handling needs.

The Brown Hoisting Machinery Co., *Cleveland, Ohio*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans

Products: Locomotive Cranes, Buckets, Belt and Chain Conveyors, Contractor's Bunkers, Etc.

BROWNHOIST

MATERIAL HANDLING · MACHINERY

When writing advertisers please mention ROCK PRODUCTS

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879.

Published Every Other Saturday by

Tradepress Publishing Corporation

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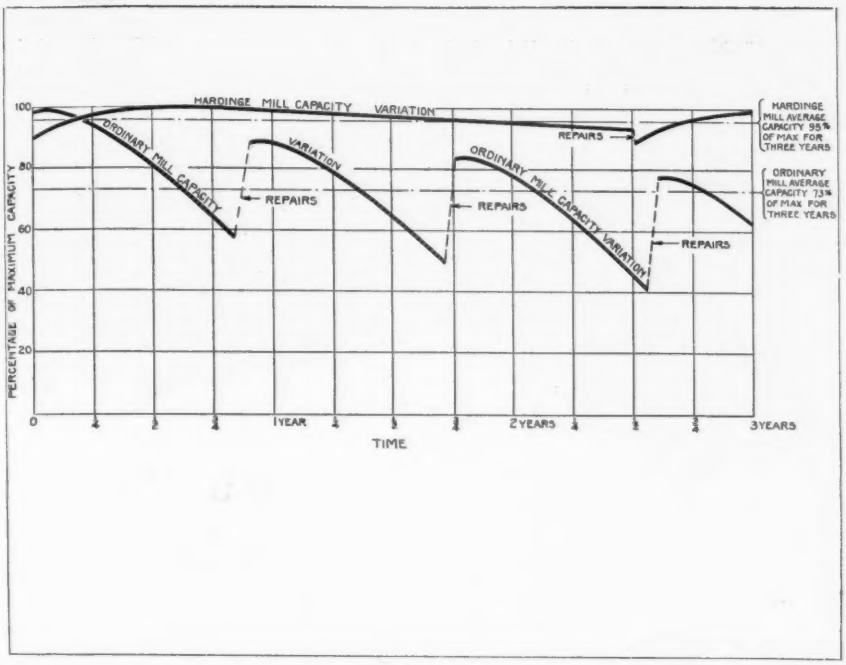

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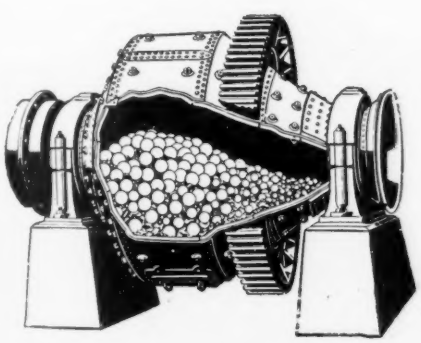

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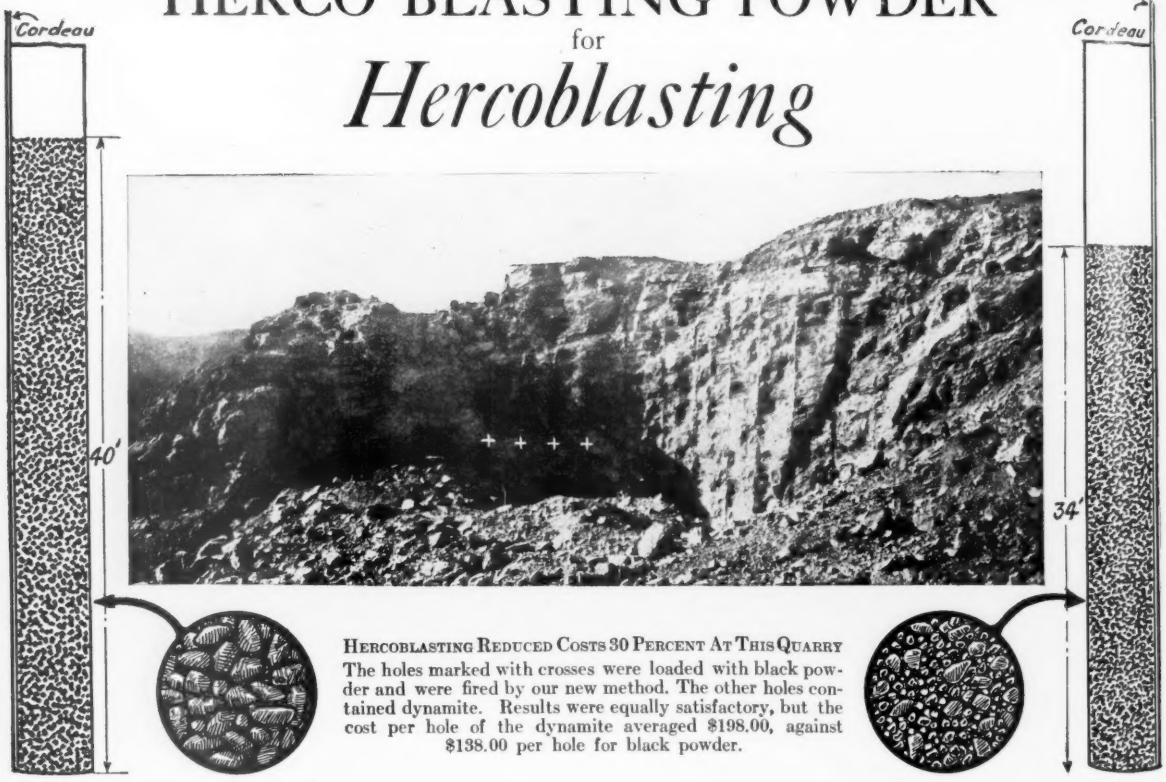

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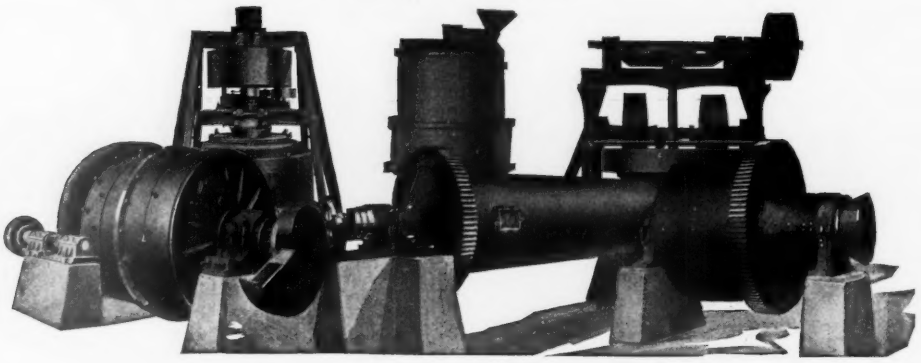

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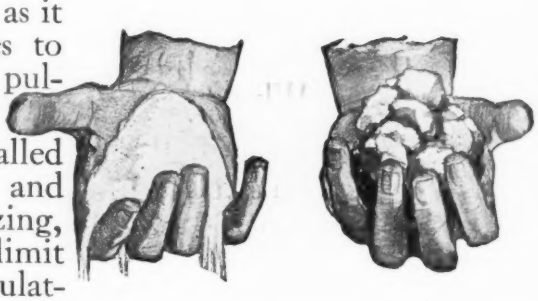

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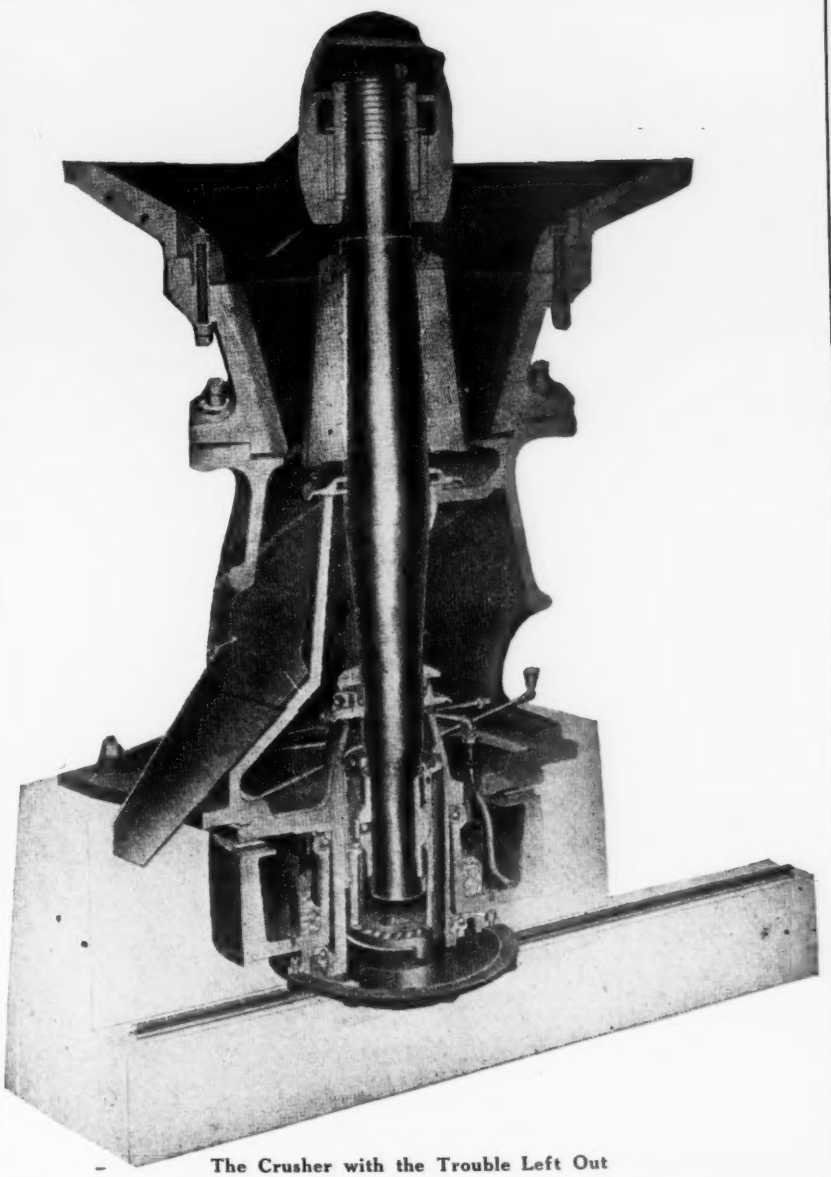

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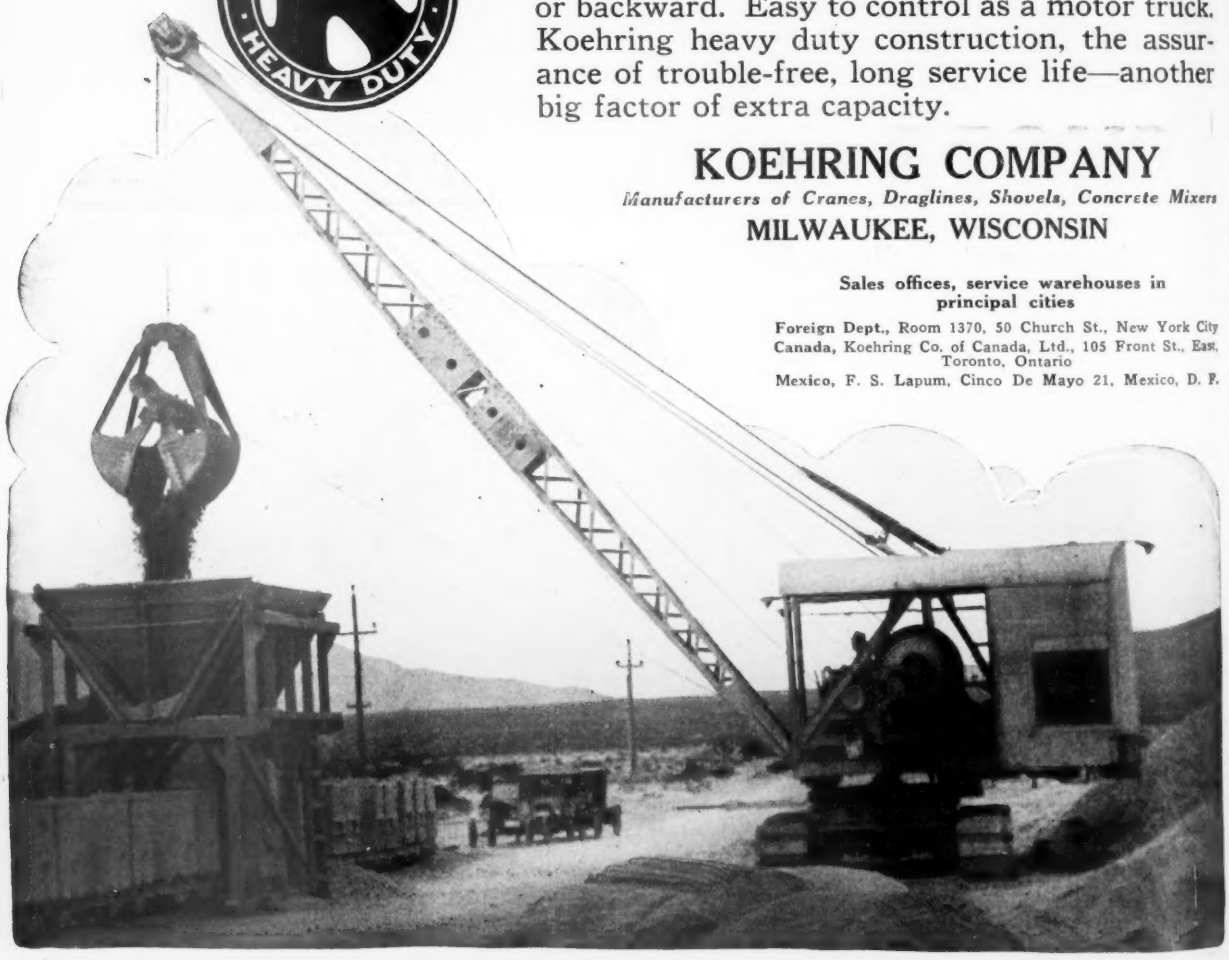

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